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MINNESOTA MEDICINE

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ORIGINAL ARTICLES

ANAPHYLAXIS* TO FOOD PROTEINS IN BREAST FED INFANTS AND ITS PROBABLE RELATION TO CERTAIN DISEASES OF THE NURSING INFANT, ESPECIALLY EXUDATIVE DIATHESIS†

W. RAY SHANNON, M.D. M.S.
St. Paul, Minn.

Current opinion holds that the nursing mother may eat whatever she desires without fear of causing disturbance in the baby. Recent researches have overthrown this contention[1]. It has been proven that egg protein may appear in the breast milk after ingestion by the nursing mother in even moderate quantity, and that it may give rise to allergic phenomena in the infant. The conclusion was drawn, as a result of this work, that it was reasonable to assume that the same might be true of any food that the mother might eat. It is the purpose of this paper to discuss the validity of this contention, and to consider some of the clinical problems arising as a result.

Anaphylaxis is a phenomenon occurring within the animal body, or under certain conditions in the excised parts, upon the introduction of a foreign protein after the animal has become sensitized to that protein. Sensitization may be inherited, passively acquired or actively attained. The latter form results within a variable period of time, usually from eight to ten days at least after the protein substance has been introduced parenterally into the body. Either the sensitizing or subsequent shock dose may be introduced by subcutaneous, intravenous or intraperitoneal injection, by absorption of undigested protein from the intestinal mucosa, or probably by absorption through any of the mucous membranes of the body.

The symptomatology varies greatly in the types of animals. Clinically the condition has been studied extensively in man. The symptoms of anaphylaxis in man are very varied. There may occur sudden severe shock, sometimes ending fatally, as upon the injection of horse serum into sensitized individuals. There may be the severe dyspnea due to spasm of the bronchioles giving rise to the asthmatic attack, studied so extensively by Walker. Irritation of the upper respiratory membranes as seen in hay fever, may be the main picture. In infants, especially, there may occur repeated respiratory infections, usually with cough. Various types of gastrointestinal symptoms may occur, as vomiting, severe colic or diarrhea. There may or may not be fever or the temperature may be subnormal. Lastly, there may be the various types of skin manifestations such as erythemas, urticarias and eczemas. These pictures may occur singly or in combination, as a result of the introduction parenterally into the body of some protein substance to which the individual has become sensitized.

Sensitivity in man is determined by the use of the cutaneous reactions. The old intracutaneous method of application has been almost universally discarded as too laborious and difficult of interpretation. The technic as described by Walker is that in most general use at the present time. He describes this as follows: "A number of small cuts, each about an eighth of an inch long, are made on the flexor surface of the forearm. These cuts are made with a sharp scalpel, but are not deep enough to draw blood, although they do penetrate the skin. On each cut is placed a protein and to

†Presented before the Minnesota State Medical Association. Duluth, Minn., August 1921

*There is difference of opinion in the literature as to the relation of anaphylaxis and allergy. In this paper the terms will be used synonymously.

it is added a drop of tenth normal sodium hydroxide solution to dissolve the protein and permit of its rapid absorption. At the end of a half hour the proteins are washed off and the reactions are noted, always comparing the inoculated cuts with the normal controls on which no protein was placed." In infants it is more practical to use the back than the forearm, especially if a large number of proteins are to be tested. Then too, it is not necessary to wait the full half hour before reading the tests. From ten to twenty minutes is sufficient.

The interpretation of the positive reaction permits of some discussion. Walker[2] requires an urticarial wheal .5 cm. in diameter for positive interpretation. The majority of men working on children have accepted this standard. According to my experience this standard is not suitable to infants. Much more frequently than a wheal one gets only an erythema. I am convinced that it is the failure to recognize this point that has led to much confusion and dissatisfaction concerning the cutaneous protein tests in infancy. Such a standard complicates greatly the interpretations it is true, because there are apt to be varying degrees of redness around the different tests and sometimes the controls will show erythema of varying degree. Nevertheless a definite erythema in the absence of a similar reaction in the control should be regarded as positive and the lesser reactions should be kept in mind. They indicate that the protein concerned may be a possible factor in the disturbance noted in the patient.

At a previous time I have said that it is reasonable to suppose that almost any food that the nursing mother eats may appear in the breast milk and cause disturbance in the infant. Since that paper was written I have shown that veal protein was present in the breast milk of two women after its ingestion. There is abundant evidence that other foods as well may appear. Talbot[3] relates the case of an eczema in a breast fed infant which cleared up upon the mother's omitting chocolate from her diet and which reappeared when she again ate that food. O'Keefe[4] obtained in nursing infants positive skin tests to cow's milk casein, oat, cod-fish, in addition to egg. In some of his cases improvement occurred upon removal of the offending protein from the mother's dietary while in others it did not.

During the past few months I have had the opportunity of studying the skin reactions to food proteins in fourteen cases that were regarded as probable food disturbances. These cases were either exclusively breast fed or essentially so. Altogether in the entire series forty different food proteins were tried. Of this number twenty-seven foods gave positive reactions in one or more cases. Nine of these foods gave a wheal at the site of inoculation in one or more cases. Seven other foods gave questionable reactions in one or more cases. This leaves only six foods which did not give possible evidence of sensitization in one or more of the fourteen cases studied.

Altogether 254 tests were done on the fourteen patients. Eighty of this number gave a positive result. Of these 80 positive tests 69 were in response to foods that the infants had never eaten. Out of the 80 positive tests 14 showed wheals, and of the 14 wheals 10 were to foods that the infants had never eaten.

O'Keefe noted that none of the mothers of the ten breast-fed infants that he tested were sensitive to the foods to which the infants reacted. I have tested the mother in five of my cases and obtained a similar result.

It is highly improbable that sensitization could have been inherited in these babies when the mothers did not react to skin tests and when they are not conscious of any discomfort upon eating these foods. This being true we must assume that sensitization is actively attained and that it could have come about only as a result of the ingestion of the foods through the breast milk. Experimental evidence is entirely against inherited sensitization through the father.

The clinical application is indeed wide-spread in dealing with diseases of nursing infants. We must admit, if we admit that foods the mother eats may appear in the breast milk, that all of the conditions to which the older child or adult is susceptible as a result of food sensitization, may be produced in the nursing infant through the breast milk. Walker mentions the fact and Talbot[5] has shown that repeated colds or at-

tacks of bronchitis may be due to food sensitization in artificially fed children. The true asthmatic attack is rare in infancy and is replaced by repeated bronchitis or croupy attacks. There are none of us who have not seen the severe intestinal upsets that have occurred in children as a result of the ingestion of foods to which the child was sensitized. Lastly, the various skin manifestations, erythemas, urticarias and eczemas have been proven too many times to be a result of food sensatization for us to deny the possibility of such an etiology. All of these pictures appear repeatedly in breast fed infants. In fact the cases showing these symptoms have been placed in a class by themselves, originally by Czerny[6] and have been described as exhibiting "exudative diathesis."

It is not easy to get cases illustrative of the individual conditions mentioned, without the other symptoms also being present. However, I have been able to pick out of my series the following cases in which the various symptoms predominated.

Case 1. An infant four and one-half months old had been nursed entirely for two months. From that time it had received milk mixtures in increasing amounts until one week before it came to my office, when it had been taken from the breast entirely. During the entire time it had a great deal of colic, with gas and curdy stools, and had cried almost constantly. Especially while on the breast it had vomited persistently. There had been constant head colds, cough, obstructive breathing and a rattle in the throat during the entire time. There had been no skin eruption. The cutaneous reaction gave erythemas to egg and milk. There being still considerable milk in the breasts the mother was taken off eggs and the infant placed back at the breast. A complimentary feeding of one-half milk mixture well boiled, was given and this was gradually decreased as time went on. Vomiting and colic ceased at once and upper respiratory infection entirely disappeared within a period of a few weeks. Later it has been necessary to again increase the amount of complimentary milk mixture and the obstructive breathing has reappeared to a mild degree. The infant still takes the breast milk without any disturbance however, and is thriving.

Case 2. A breast-fed baby in whom the feeding had been supervised throughout, had begun to have a great deal of colic, with curdy, frequent stools and constant crying after a few weeks of apparently normal existence. Analysis of the breast milk had shown 6.5 per cent fat for the twenty-four hours. It was found that the mother ate one egg every morning for breakfast. A sample of breast milk was analyzed by anaphylactic tests and egg protein found. The mother was taken off eggs and foods containing eggs, with the result that improvement began within two days of this time and inside of a week the infant was normal, except that there were still a few small curds in the stools. No attempt was made to reduce the amount of fat in the diet.

Case 3. A five and one-half month old breast-fed baby had had considerable colic for a month after birth, accompanied by a blotchy appearance of the skin and repeated head colds, with constant nasal obstruction and mucus in the throat. Symptoms had disappeared after two months, except that the stools had always contained more or less curd. Suddenly of late the colic had returned, with large curds in the stools, considerable gaseous distention of the abdomen and constant crying. Upon testing the baby with the foods that the mother was eating marked erythema was obtained to beef and lesser reactions to peas, egg white and veal. The mother was taken off the foods mentioned. For three days the baby continued to be fussy, but since that time all signs of colic have been absent. Even the stools, which have always been curdy, have become normal.

Case 4. An over-fed nursing baby three weeks old had been having a great deal of colic, with curdy stools, gaseous distention of the abdomen, and constant crying. Regulation of feeding to the theoretically normal amount did not cure the condition. The baby was tested with the foods that the mother was eating and erythemas obtained to veal, egg white, whole egg and beef. The mother was taken off these foods. The symptoms have entirely disappeared except for small occasional curds in the stools.

Case 5. A four months old nursing baby had been treated for a few weeks for a typical scaling eczema. The baby had gotten worse. It was then tested with the foods that the mother was eating. Erythematous reactions were obtained to egg yolk, potato, rye, carrot, rice, corn and veal. Egg white gave an erythema and wheal. The mother was taken off these foods. Improvement was very rapid so that in three weeks the skin was almost entirely clear. For a short time after that a trace of the eczema would come and go. For a considerable time past the skin has been perfectly clear.

Case 6. A six weeks old nursing infant had had colic ever since coming home from the hospital at about two weeks. There had been a slight rash on and off on the forehead. There was a definite seborrhea on the scalp and there were milk crusts on the cheeks. The condition improved somewhat under ordinary measures but the stools were still slimy and seborrhea still marked on the scalp. Empirically the mother was taken off eggs. When the mother returned two weeks later the baby was normal and has remained so since.

The preceding cases have been simple. I wish to mention several of the more complex cases in which the sensitization has been widespread.

Case 7. A three month breast fed baby had a severe weeping eczema over the face and a papular scaling eczema over the head. He was tested with the foods the mother was eating and erythematous reactions obtained to egg-yolk, casein, grapefruit, lactalbumin, strawberry, carrot, egg-white, corn, rice, peas, veal, asparagus, chicken and potato. Those foods to which the reaction was most market were stricken from the diet of the mother. The other foods were limited in quantity as much as was considered safe for the preservation of a sufficiently well balanced diet. The eczema was worse for a period of two weeks, when the child was placed in the hospital in order to control the scratching. In two days there was very marked improvement. Two weeks later the eczema had cleared up entirely except for a slight palpable roughness over the cheeks. When later seen (six weeks after the first visit) the patient's skin was as smooth as any baby's.

Case 8. A baby seven and one-half months old had more or less eczema since two months old. It had gradually spread until when first seen there was a scaly, itchy eruption over the entire face and scalp, with a papular eruption over the forearms. Besides breast milk the infant had received wheat cereal, milk, carrots and soda crackers. Erythematous reactions were obtained to lima beans, beef, banana, salmon, mackerel, potato, pork and questionably eggs and rice. Carrots gave both an erythema and wheal. Those foods that gave the strongest reactions were removed from the diet of mother and patient. The others were limited as much as possible. There was a rapid and marked improvement of the eczema, but there still remained a slight scaliness of the left cheek and temple six weeks later. At this time the baby began to break out in another attack. This was concomitant with the cutting of two teeth. Tested again, erythematous reactions were obtained to wheat, which had previously been negative, and spinach which had not been tested before. These foods were removed from baby's and mother's diet. When seen one week after the last tests were performed there had again been marked improvement. Four weeks later the skin was as smooth as any baby's.

Exudative diathesis has been described as a congenital constitutional anomaly which manifests itself by certain symptoms. Czerny described as the typical lesions, the geographic tongue, the seborrhea on the scalp and milk crusts on the cheeks, which tend to give rise to eczema, prurigo (or a chronic urticaria), repeated respiratory infection and phlyctenular disease of the eye. The geographic tongue and the phlyctenular disease of the eye have been largely disputed. However, it is quite generally conceded that repeated respiratory infections, seborrhea, milk crusts, urticaria, and the various types of eczema are definite manifestations of exudative diathesis. To this should be added gastroenteritis in the form of colic, vomiting, diarrhea and gaseous distention of the abdomen.

I have already pointed out that urticarias, eczemas, repeated respiratory infections, vomiting, colic, diarrhea and the various other gastrointestinal disturbances, have been proven to be due to food sensitization in older children and adults. Why then should such an etiology be denied for the same group of symptoms in breast fed infants? It cannot be denied if we recognize that foods the mother eats may appear in her breast milk.

Among the cases presented, several of the fundamental symptoms of exudative diathesis are shown. *Case* 1 showed as the outstanding complaint vomiting, colic, diarrhea, constant head colds and bronchitis while on the breast. This ceased entirely when egg was stricken from the mother's diet.

Case 2 had colic. Egg was found in the breast milk. It was removed from the diet of the mother and the colic ceased. This occurred in spite of the fact that there was 6.5 per cent of fat in the breast milk, which Czerny says is the responsible factor in many of these cases.

Case 3 complained of colic but had had skin and respiratory manifestations. She was found to be sensitive to several foods the mother was eating. They were removed from the diet and the colic cleared up in three days and has not returned. Even the curdy stools which had always been present disappeared.

Case 4 had a similar complaint and cleared up under specific therapy.

Case 5 was an eczema which had become worse under the ordinary methods of treatment. Removal of the offending proteins from the mother's diet practically cured the disease in three weeks, using the same local treatment.

Case 6 showed a milk crust and seborrhea in addition to colic. Empirical removal of eggs from the diet, because of the fact that the

mother was eating eggs daily, caused a complete disappearance of the symptoms in less than two weeks' time.

The handling of the preceding cases has been simple. Results were prompt and definite. It will be noticed that the number of foods to which the infants were sensitive was small. The more severe eczemas are often sensitive to a very large variety of foods that the mother eats. This greatly complicates treatment and results are far less satisfactory.

Case 7 was such a case. The baby was sensitive to twelve foods which obviously could not all be stricken from the mother's diet. It was necessary to omit the foods to which the baby seemed to be most sensitive and to cut down on the others. Improvement was naturally much slower and more careful attention to the details of local treatment were necessary. Nevertheless, this case cleared copletely within six weeks.

It is characteristic of eczema to break out anew from time to time and especially is it apt to be severe at times of teething. *Case* 8 illustrates this. It had been sensitive to ten foods and had responded to specific treatment well. Six weeks later two teeth erupted and there was a marked exacerbation of the eczema. It was found to have become sensitive to one food that had been negative at the previous time and to another food that had not been tested before. Removal of these foods from the diet of the mother and infant caused prompt improvement again.

It is not the purpose of this paper to discuss the etiology of exudative diathesis. I mention only the fact that Czerny thought it to be due to fat intolerance and dismissed proteins as an etiological factor with the statement that they need not be discussed. This seems to be the accepted view in this country. Several writers have advanced the theory of anaphylaxis as the cause, but have apparently attracted little favorable comment[7]. I wish merely to state that most of the symptoms of exudative diathesis in nursing infants are usually, as in the cases cited, caused by allergic reactions to foods brought to the infant through the breast milk. The evanescent character of all of the symptoms, their tendency to get now better, now worse, gives strong supportive evidence to such an opinion. The role of fat in causation of symptoms, the effect of external irritation and the influence of the hypersensitive nervous system, will all be left for discussion in their secondary role, to a future time.

CONCLUSIONS

1. Egg and veal protein may appear in the breast milk after their ingestion by nursing mothers.

2. Strong clinical evidence is offered that the same is true at times of almost any food that the mother may eat.

3. Colic, vomiting, diarrhea, repeated respiratory infections, milk crust, seborrhea and eczema in breast-fed babies, are often the result of allergic reactions to foods coming to the infant through the breast milk.

4. In the cutaneous test on infants the erythematous reaction is more common than the wheal and therefore more important.

5. Sensitization often is multiple and may be to a majority of the foods in the mother's dietary.

6. The repeated exacerbations of eczema in brest-fed babies may be due to newly acquired sensitization to foods the mother eats.

7. The manifestations of exudative diathesis in nursing infants are the result of anaphylactic reactions to food proteins in the mother's dietary, and not a result of fat intolerance, in the majority of cases.

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DISCUSSION

DR. J. T. CHRISTISON, St. Paul: Ever since Czerny gave us his idea of the exudative diathesis we, as pediatricians, have been groping in the dark. We knew we had these eczemas to treat, we knew there were colicky babies that we could not control, and we wondered why. It never occurred to us at that time to doubt Czeny's assertion that the fat in the baby's food was responsible for these conditions. All of you will call to mind the child with the generalized eczema and how your heart dropped

when you saw that child undressed, knowing as you did that you would in all probability tell the mother she might hope for a cure within twelve to eighteen months.

This work of Dr. Shannon's is an epoch-making thing. It is going to change our ideas very materially in regard to nursing infants and we are going to control the mother's diet instead of telling her that she may have anything to eat that is good for her husband.

There is very little to be said because Dr. Shannon has covered the ground so thoroughly. We know that much can be accomplished by the careful, painstaking study of each individual and a thorough going over of the protein sensitization. Insofar as the cases of eczema are concerned, it is perfectly marvelous to see how rapidly they clear up when the offending protein is removed from the diet of the mother.

The thing I wish to impress upon all of you is not to say to the mother that she may have anything she wishes, but to take the time to find out what it is she is eating that is causing the trouble in the infant. I suppose it is within the memory of some of you that certain foods were formerly prohibited —at least upon looking through the literature one finds reference to the fact that various foods should not be given to nursing mothers, and I am sure we are doing them a gross injustice when we tell them that they may take anything that agrees with them.

Another thing you will all remember. In the literature of infantile eczema, we often run across the statement that it is a bad practice to drive an eczema too rapidly to a cure because sudden death may occur. Sudden death may occur, it is true—we have all seen it,—but it is in all probability due to the overwhelming action of some protein substance that the child is getting through the mother's milk rather than driving to a cure by whatsoever medication may be used.

We feel that this work of Dr. Shannon's is going to revolutionize our ideas of the exudative diathesis.

DR. S. E. SWEITZER, Minneapolis: I think Dr. Shannon is to be congratulated on his original work. I should like to ask what food tests he uses. The children I have had tested very often are not breast-fed so a change in the diet of the mother would not have much effect. Unfortunately, many of the tests do not turn out well. Dr. Shannon has had such very brilliant results in the cases he has reported, that I would like to know what he uses. In the cases I tested, many did not show any reaction.

DR. T. L. BIRNBERG, St. Paul: I rise because I think such a paper should have more discussion. It certainly is a valuable contribution. In the diagnosis of the exudative diathesis we should not accept the opinion of Czerny as infallible. His opinion is not as sharp and fine now as it was years ago. Seven years ago he said that "exudative diathesis was that constitutional condition characterized by an exudation in the skin and mucous membranes." That covers the manifestations not only of the skin but of the internal mucous membrane. Then he says, the cause is complex; one cause is too much animal fat. That is interesting because, when he spoke that way, he must have meant proteids. He said that the worst animal food was eggs—he did not say cream. Next to that the worst animal food is milk. Milk, he said, was harmful in every respect. Apparently, the fat content is the most harmful, but all other ingredients of the milk are also harmful. That is his opinion of the exudative diathesis as it rests today, and as it was seven years ago. His idea of therapy was to avoid animal foods as much as possible and try to replace them by non-animal foods. If milk should be given, give fat-free milk, and exclude eggs absolutely, which is just what Dr. Shannon has said.

The work Dr. Shannon has done is very interesting and should stimulate our physiologists to do something. We did not realize that the blood was full of egg proteids and meat proteids. Our physiologists will learn more of the why and when and the cause of proteids being circulated in the mother's blood, and consequently we will learn more about the treatment of these exudative diseases.

DR. A. H. SANFORD, Rochester: I wish to congratulate Dr. Shannon. I think that perhaps he has placed a time bomb in the camp of the immunologists, that is, as to the question whether asthma is a manifestation of true "anaphylaxis" or so-called "allergy." The statement has been made that the asthma associated with hay fever is of the allergic type because it is inherited sensitizations and not due to acquired sensitivity to these proteids. Possibly the manner in which the "egg asthma" child acquires his egg sensitization for instance, is through the mother's milk, as described by Dr. Shannon. I would like to inquire of Dr. Shannon whether he has gone into the family history to find whether these children do inherit any tendency to hay fever and asthma. June Adkinson reported in Walker's 400 cases and in Cooke's 600 cases of bronchial asthma that the tendency to hypersensitivity followed the Mendelian law.

DR. ARTHUR H. SCHWARTZ, Duluth: I am sure all the dermatologists will be glad to turn their eczemas over to the pediatricians. (Laughter.) There is no question but that a good many of these eczemas in babies will continue in spite of the fact that they are removed from the breast. Another fact to consider is that an eczema will get better and get worse in spite of treatment.

I would like to hear from Dr. Shannon a little more of the previous history of these eczemas and the beginning picture in these cases.

DR. C. N. HENSEL, St. Paul: Dr. Shannon had a bully paper and I was very glad to hear it. For four years I have been using the skin tests in hay fever and asthma cases and find a number of so-

called "year round hay fever" cases who are sensitive to foods, chiefly the cereals and especially wheat. Cutting the offending food from the diet relieves these cases.

Is this adult sensitization dependent on an infantile food idiosyncrasy—an exudative diathesis? An understanding of this might help in treating adults. It might be well for Dr. Shannon to explain the technique of making the skin tests.

The skin test is absolutely specific; a negative skin test means that the individual is not sensitive at least at that time. Eating of the offending food may cause the skin test to become positive where abstinence from the offending food has caused the test to be negative.

DR. W. RAY SHANNON, St. Paul, (closing): Replying to Dr. Sweitzer, the foods used were those that the mothers most frequently eat—eggs, milk, whatever cereals they most frequently eat, wheat, cocoa, chocolate, and things of that kind. I find very few cases of eczema in breast-fed babies that do not react to one of the foods the mother eats. I do not know how to explain Dr. Sweitzer's lack of success along that line unless it be that he has not interpreted the erythema as a positive result. I know that a positive erythema indicates sensitization because I have obtained results by that method. The erythema will often persist for twenty-four hours and produce an indurated lesion. There is no question but that an erythema within the first thirty minutes in the absence of a similar reaction in the control is an actual indication of protein sensititization.

Replying to Dr. Birnberg, I have had cases in which grape fruit and in others asparagus—definitely vegetable foods—were responsible.

The relation of allergy and anaphylaxis has not been settled. There is a question as to whether there are not two apparently different phenomena, which are perhaps fundamentally the same. Allergy and anaphylaxis were used throughout this paper as analogous terms.

As to family history, there is a very great preponderance of these cases that have a history of asthma and hay fever or eczema in the family just as other men have found. That has nothing to do with anaphylactic manifestations but has to do with the etiology of the exudative diathesis. I did not say that the exudative diathesis was due to anaphylaxis, but that the indications were due to anaphylactic phenomena. Heredity may have its effect on that particular mechanism which permits sensitization to occur, but it has no effect at all on the production of the manisfestations in the individual.

I have mentioned the previous history of some of the cases. All of the cases have not been treated previous to my trying the anaphylactic experiments, but the results have been so prompt and so much better than in other cases that I felt justified in drawing the conclusions I have.

As for asthma in late life being associated with an exudative tendency in early life, there unquestionably is such a relationship. The extensive works Dr. Sanford mentioned have shown that relationship.

The skin tests are made according to the Walker technic, where a scratch is made on the skin and then some 0.1 normal sodium hydroxid is applied. The protein is then dissolved in the solution. The erythema comes on within ten to twenty minutes as a rule. There is often great difficulty in interpreting the reactions, but if you keep in mind that this may occur and are very careful in making the positive interpretations it is a very helpful procedure and will give definite results. The skin reaction is not always specific. You sometimes get a negative reaction in cases that are sensitive to certain types of food. This may occur if the individual has not been eating the food for a considerable length of time, but the cutaneous sensitiveness will recur if he eats the food again. Dr. Walker has already proven this.

MANIFESTATIONS OF THE SPASMOPHILIC DIATHESIS IN OLDER CHILDREN*

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The etiology of the disease entities due to deficiency of the calcium metabolism is still open to much discussion. The literature on the direct causative factor of the failure of proper retention of the lime salt in rickets is extremely voluminous and it is not the intention of this paper to enter into the discussion of the various theories. Rickets and spasmophilia are generally considered more or less distinct conditions. There is no doubt, however, that they are closely related and that both are due to a failure of the retention of the lime salts which are supplied in sufficient quantity in the usual dietary of both infants and older children. We know that spasmophilic convulsions are more frequent in patients showing some of the numerous manifestations of the symptom complex known as rickets. Both conditions are relieved by supplying large amounts of calcium and holding it in by the use of cod-liver oil.

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It has been our experience that the rachitic infant is extremely irritable during the acute stages of the disease. This irritability is ascribed to the pain in the musculature and in the osseous system, in which case the child objects to being handled and refuses to use his muscles. On the other hand, some of it is due, no doubt, to the increased nervous irritability as shown by the Thiemich's and Chvosteck's signs, for the nervous system probably suffers equally in the loss of calcium with the osseous and muscular system. Sedgwick[1] defines spasmophilia as "a condition of irritability of the nervous system, especially common in early childhood, distinguished by galvanic and mechanical hyper-excitability of the peripheral nerves and a tendency to tonic and clonic convulsions." The calcium content of the blood is definitely lowered in infants with signs of active rickets and tetany[2]. In older children the findings are far from definite, being subject to slight variations only, nor is the content much influenced by the administration of calcium by mouth[3].

The convulsive stage of calcium deficiency is usually the extreme; the child has suddenly lost sufficient lime salts to cause an outbreak of a convulsive nature; or, an acute intercurrent disease further unbalances the already overtaxed nervous system. The prodromes may be slight and are often entirely overlooked, even by the mother. Not uncommonly the first intimation of illness is the convulsion itself. Between the distinct tetanic attacks the child is irritable, restless and peevish. Examination may or may not reveal an acute pathology with high fever to explain the convulsion. In the typical case, Chvosteck's and Thiemich's signs are present and the administration of calcium in liberal doses produces prompt relief of the heightened electric reactions and it is often possible to promise the parents that no more convulsions will occur.

In the older child, that is the child between four and seven, the nervous balance is better established and the true spasmophilic convulsion is less common. Assuming that the normal values of Thiemich's sign are about the same in the young infant and in the child of six, the attempt has been made to determine increases in a number of children between the ages of four and seven. Among these it was possible to show that six had apparently increased electrical reactions as shown in Table 1.

TABLE 1

Number	Age	Sex	CCC Ma	ACC Ma	AOC Ma	COC Ma	Chvosteck	Season	Complic.
I	5	F	1.2	4.2	2	*5	2	Fall	
II	7	F	1.8	3.8	2.0	*5	2	Fall	
III	6	M	2.4	*5	2.4	*5	1	Spring	Tonsillitis
IV	3	M	0.8	4.0	1.2	*5	1	Spring	
V	3½	M	1.6	3.5	2.0	4.2	2	Spring	
VI	4	F	2.1	*5	2.4	*5	0	Spring	Pyelocytitis

These six children were brought for examination because of extreme restlessness, peevishness, anorexia and disturbed sleep. Physical examination in all except cases three and six showed a normal child. Case three had a mild sore throat, and case six chronic pyelocystitis under treatment. Cases one and two occurred in the fall of the year and the others in the spring.

In five of these cases calcium was immediately prescribed, giving six grams of the chloride in twenty-four hours. In the earlier cases, i. e., one and two, no cod-liver oil was given until after the second examination[4]. In case six no calcium was given, but the child immediately received 8 c. c. of cod-liver oil twice daily[5]. The results of the administration of the more or less specific agents upon the electrical reactions is seen in Table II.

TABLE II

Number	Therapy	Days Since 1	CCC	ACC	AOC	COC
I	Calcium chloride 6.0 daily	4	2.1	*5	2.4	*5
II	Calcium chloride 6.0 daily	3	2.0	*5	3.0	*5
III	Calcium and cod liver oil	7	3.4	*5	*5	*5
IV	Calcium and cod liver oil	5	3.0	*5	*5	*5
†V	Calcium and cod liver oil	10	2.0	4.8	2.5	*5
VI	Cod liver only	16	4.	*5	*5	*5

†Refused cod liver oil.

The results as judged from the electrical reactions are definite, but not nearly as satisfactory

as the reports of the parents. Cases one and two were given the classical Kassowitz mixture immediately after the records shown in Table II were made and in a few days time the restlessness was very markedly reduced. Cases three and four showed prompt improvement in their general condition. One mother reported that the child could now sit still for a minute at a time. Case three was treated for the mild tonsillitis. Case five was a rather difficult patient and the Kassowitz prescription had to be given in form of an emulsion before the child would take it. After this the "nervousness" improved. He has since spent most of his time out of doors quiet and sedate. Case six responded quickly to the Kassowitz, calcium was not given because the patient was taking potassium citrate to alkalinize the urine. The pyelocytitis has practically cleared up.

Case four was the most typical of the group and a resume of the history is cited.

R. B. Born May 15,1918. Three years old at time of examination. Second child. History of infancy shows some difficulty in feeding. Child had breast and complemental feeding until six months of age after which a whole milk mixture. There is no record of rickets. At 18 months had slight convulsion, said to have been brought on by acute tonsillitis.

Present complaint: Mother brings child because of extreme irritability, cries very easily, constipated, appetite very poor, extremely restless sleep, waking up with a cry and refusing to go to sleep again unless rocked. All this, according to the mother, is very unusual. "He can't sit or stand still a second." second."

Examination: A well developed child of moderate nutrition, good musculature, slightly precocious, color good. Child is rather difficult to examine. Weight 30.5 pounds, Hb. 80 per cent, WBC. 9,280. Urine negative. Temperature 99°. The physical examination showed no abnormalities, excepting moderately enlarged tonsils and probably some adenoids, but no mouth breathing. No rosary or enlargement of the epiphyses. A very slight bowing of lower third of tibia, but otherwise straight and well formed. Electrical reactions were taken and found to be as shown in Table I, Case IV.

Treatment: With regulation of diet and general hygiene, the child was put on calcium chloride 1.0 gm. six times per day, and 8 c.c. of the phosperous and cod-liver oil prescription twice a day.

Subsequent course: After five days, mother reports child distinctly less "nervous." Sleeps better, but is still fussy. The electrical reactions as shown in Table II. Physical examination as before. The medication was continued giving the calcium for twelve days and the cod liver oil for one month. At the end of that time the electrical reactions as in Table II and according to report of mother the child was normal. The Hemoglobin was 85 per cent and the appetite excellent, sleep absolutely undisturbed. and cod liver oil prescription twice a day.

CONCLUSIONS

1. While the chemistry of the blood may not reveal great changes in the calcium content, there is a hyperexcitability of the nervous system which can be shown by the electrical reactions.

2. The condition is relieved by the use of liberal doses of calcium, combined with cod-liver oil.

3. The determination of the electrical reactions is a simple procedure and the results obtained justify the further study of the condition.

400 Lyceum Bldg.

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DISCUSSION

DR. T. L. BIRNBERG, St. Paul: It gives me great pleasure to be able to discuss this paper. Unfortunately, spasmophilia in older children has been neglected. There is no doubt that spasmophilic symptoms persist into later childhood, "late spasmophilia." In fact, not only is spasmophilia continued into later childhood, but observation shows that almost all patients who had spasmophilia in infancy became neuropaths in adult life. Still further, observers agree that not only is spasmophilia extended into adult life, but begins, in fact, before the child is born. That is, there is a constitutional, inherited predisposition to spasmophilia in certain families. In fact, certain races even show weakness in this direction. I have seen a few cases of spasmophilia in breast-fed infants, but almost all of them had a neuropathic inheritance.

This brings us to the modern conception of pediatrics; that is, all infants can be divided into groups, or diatheses. Old fashions return even in medicine, and, as Gerstley ably wrote, children should not be treated as heart cases or kidney cases but as patients first, and as having a diseased heart of kidneys or nervous system second. A child should always be treated with its constitution in mind, whether it be spasmophilia, exudative diathesis or pastoes diathesis. These children with the neuropathic constitution show symptoms early in life. They are nervous, irritable, sleepless and easily aroused by the slightest noise. This continues, more or less, all through life and, if the calcium content becomes low, they easily get convulsions.

When this type of child gets an infection he is prone to convulsions, while another type of child would not react. We have noticed this spasmophilic tendency in other conditions besides convulsions, especially in cyclic vomiting, where in spite of tonsillectomy and correction of diet and attacks of vomiting occur, showing a neuropathic root. These patients have a marked "chvostek". We find great improvement in increasing their calcium absorption by means of phosphates and cod liver oil.

Another type of late spasmophilc manifestation is in the type of asthma without food sensitization or infection. Here often a marked Chvosteck is found and considerable improvement obtained by phosphates and cod liver oil.

In our cases of convulsions, due to later spasmophilia, we have the same good results from the phosphates and cod liver oil that Dr. Scherer has shown. First, the child is less irritable between attacks, then the convulsions disappear. The clinical signs are more important than anything else. The electrical reaction are not reliable, for one day they are present and the next, they are absent again.

As to the point mentioned by Dr. Scherer of the effect of seasons. The seasons effect spasmophilis in two ways. First, in spring and fall we have less sunshine than in summer and consequently more spasmophilia. As Dr. Hess has shown, in exposing a child to direct sunshine the calcium content of bones will increase; second, in spring and fall we have more infections, which stir a latent spasmophilia into an active one.

DR. HENRY W. WOLTMAN, Rochester: We see a number of adults who have decided evidence of tetany, and a great many give a history of having had attacks in infancy that were probably spasmophilia. I understand that infants respond very well to cod liver oil and calcium. I do not see why there is such a marked difference in response to therapy between tetany in infants and in adults. I wonder whether Dr. Scherer can explain this.

DR. HERBERT WILLIAM JONES, Minneapolis: I think this is very important work, and Dr. Scherer should carry it on. I think it comes in line with Dr. Bloodgood's remarks, that if we are to cure disease we must stop it before it starts. It seems these children inherit improper tendencies and these tendencies are increased by improper feeding and things of that kind. In one family that I have taken care of for many years the father was a neuropathic man who used to get up at night and figure how he could make more money out of a deal than somebody else. His four children have all inherited that extreme neuropathic tendency. Two boys married and they have children. One of them married a girl with this extremely irritable nervous system, with pains in the back and so on, and the other married a rather stable girl with a normal nervous system. The children of those parents who are both rather spasmophilic have been very neuropathic and probably will grow up that way. The boy who married a girl with a stable nervous system has a rugged child, who will probably grow up that way. I think this work is very important for the future of our race and hope it will be carried on.

DR. C. A. SCHERER, Duluth, (closing): Dr. Woltman's discussion reminds me of an experience when I first started this work. A colleague approached me with the same question and tried it out on a woman, and I think she sued him for malpractice. Personally, I cannot see why the adult should not respond to the use of calcium chlorid and especially when used with cod liver oil to increase the retention of the calcium salts, but I do not know that any work has ever been done on it as the subject has interested only pediatrists.

Dr. Jones has thrown a confusing element onto the perfectly clear disease entity of spasmophilia due to failure of retention of lime salts. His contention is very interesting because in following up the family history we may get to the causation of rickets. At present the literature is filled with the etiology of rickets, and there are many different viewpoints. I think a study of the parents, questioning whether they have ever had any trouble that could be laid to failure of retention of lime salts, may give us an inkling of the basic causation of rickets.

URINARY LITHIASIS IN CHILDREN*

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Differences of opinion exist concerning the prevalence of urinary lithiasis in infancy. In this country few cases have been reported and the text books and journals contain few reports or articles concerning the subject.

Collins, in 1913, reviewed the literature and reported a patient whom he had observed. This is the most complete contribution that has been published in the United States.

OCCURRENCE

Holt, basing his observation on a thousand autopsies, finds calculi common in infants. He writes that stones are frequently voided during the first two years of life. Langenbeck found a calculus in the bladder of a six months' fetus. Brendel reports two babies with urinary lithiasis occurring two days after birth. The foreign literature contains large series of reports of urinary stones in infants. One writer found forty-seven per cent of a large number of urinary stones occurring in children. Another writer located in Hungary, collected eighteen hundred and thirty-six reports of children with urinary lithiasis. Dr. J. O. Thompson found thirty-eight per cent of five hundred and eighty-six patients with urinary stone in children under fifteen years of age. This report is from the Canton Hospital.

We have been able to collect, by means of a letter sent to the members of the American Urologic, American Pediatric and the Central States Pediatric Societies, two hundred and three reports of children or infants with urinary lithiasis. Included in this series are five patients whom we have personally examined and studied.

The average age is seven and eight-tenths years. Forty of the total number of cases collected, occurred in children up to five years of age, sixty in children between five and ten years, and fifty-eight between ten and fifteen years. In forty-five instances the age was not given. We found one hundred and fifty-five males and forty-five females (about three to one). In three the sex was not specified.

From the data which we obtained by means of this circular letter, we were unable to determine the relative frequency of urinary stones in infants as compared with adults. We are of the opinion, however, that this condition occurs much more frequently than is generally supposed. Many cases are not recognized. It is quite certain that a great many small stones are passed by the infant after a supposed attack of intestinal colic. Unless the urine has been totally arrested for several hours or a day, the mother's or the physician's attention may not be directed to the urinary organs so the urinary stone is not suspected. Children living in certain localities seem to be more susceptible to stone formation.

ETIOLOGY

Although infants, children and adults, are not subject to the same degree of infection and trauma, the same theories can be used to explain the formation of stone. It is not possible for us to estimate the number of children who suffered from severe infections, nor could we estimate the relation of trauma to stone formation. The nutrition of the infants or children was not considered. The type of food which was given, whether breast fed or not, was not observed. These data are important and will form the basis of a paper which we hope to publish later.

One writer is of the opinion that stones are more prevalent in children who have passed through one or more of the severe infections. Kretschmer, in a recent paper on "The Treatment of Pyelitis in Infancy and Childhood," found stones present in a number of instances. It is rather difficult, however, to determine which was present first,—the stone or the infection. The composition of the stones removed was not ascertained. As the organs of metabolism in the infant and child are more subject to upsets than those of the adult, it is possible to believe that faulty metabolism, together with infection and trauma, may be the basis of kidney stone.

The large fluid intake of most children and infants, if such fluids contain an excess of salts

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with peculiar chemical properties, may explain the formation of calculi.

Keyes, in a recent article writes, "Urinary stones consist of nonacicular crystals about a nucleus of organic matter." He also states, "Concentration of the urine in the presence of pus or blood, due to trauma or disease, must be the occasion of stone formation."

LOCATION

The location of the urinary stones in the two hundred and three patients which we report is as follows:

Right kidney twenty-one patients, or ten per cent; left kidney eight, or three and nine-tenths per cent; right ureter, seven or three and four-tenths per cent; left ureter, eight or three and nine-tenths per cent; bladder, one hundred and sixteen or fifty-seven per cent; urethra, twenty-five or twelve per cent; one kidney and one ureter, nine or four per cent; both kidneys, fourteen or six per cent; both ureters, one; both kidneys and ureters, one.

In this series sixty-nine per cent of stones had passed from the kidney or were formed in the lower urinary tract, that is, the bladder or urethra. We found thirteen per cent in the kidneys only and eight per cent in the ureters only. In other words, the majority of kidney stones in children seem to pass from the kidney. It is interesting that only eight per cent of stones were found in the ureter, indicating that stones pass rather easily through the infant ureter and that only a small number remain in the kidney. Although important, we did not get information which made it possible for us to determine the number of patients with stone in the kidney as compared with those with stone in the pelvis.

SYMPTOMATOLOGY

CHART I

	Pain	Hematuria	Pyuria	Dysuria	Frequency	Nausea and Vomiting
Renal stone.....	93%	57%	30%	11%	30%	4%
Ureteral stone..	87%	54%	20%	12%	39%	10%
Bladder stone...	60%	42%	48%	50%	50%	0%
Urethral stone..	68%	48%	28%	48%	48%	0%

Considering the entire urinary tract, we find the following symptoms most common: (1) pain and colic, (2) hematuria, (3) frequency, (4) pyuria, (5) dysuria, (6) nausea and vomiting.

Pain occurred more often with kidney stone than with stone found in the bladder, ureter or urethra. Pain was a prominent symptom in fifty-four per cent of the total number of patients reported. As in the adult, renal stone in the infant may be symptomless. When they are loose in the pelvis and lodge in the uretero-pelvic juncture or in the ureter, pain is pronounced. In very few instances, however, was prolonged, severe pain a prominent symptom. We find that ninety-three per cent of renal stones gave a history of pain, indicating that the great majority of the stones found in the kidney, were loose in the pelvis. In adults, renal stone in the kidney cortex may cause little or no pain. In this series we find that only eighty-seven per cent of the patients suffering with ureteral stone complained of pain. The infant's ureter must be capable of great distention and complete plugging or obstruction cannot occur as often as it does in the adult. We know of no condition that will as universally produce severe pain as will the passage of a stone through the ureter. Frequently, it is necessary to differentiate renal or ureteral pain from intestinal colic. With intestinal colic, the child cries intermittently, while in the presence of ureteral stone the baby or child may cry for many hours because the pain is usually continuous. The sudden cessation in the crying may indicate that the stone has passed into the bladder or has passed through the urethra into the napkin. With ureteral stone, diarrhea is absent. This finding is usually positive with intestinal colic.

In Monsseaux's series of eighty-seven patients, *hematuria* was present in only eight. It is infrequent that an urinalysis is made in infants suffering with abdominal pain (fifty-two per cent in this series) so that gross blood is more often reported than microscopic blood. It is our opinion that an urinalysis of every patient would reveal blood in a larger number than we were able to report. Gross blood in the urine does not seem to be diagnostic of the location of the stone, as in this series this finding was of approximately equal frequency. With kidney stone, blood was reported in fifty-seven per cent; with bladder stone forty-two per cent; with ureteral stone fifty-four per cent and urethral stone forty-eight per cent.

Pyuria was reported in forty-eight per cent

of bladder stones and in thirty per cent of the renal stones. This is a report of macroscopic findings and does not indicate the findings after a microscopic examination. Because of the infrequency of an urinalysis, it is impossible to determine the relative frequency of pyuria.

Dysuria with bladder and urethral stone was reported in fifty per cent of the cases. With ureteral stone, this symptom was noted in twelve per cent and with renal stone in eleven per cent.

Anuria may occur when a stone becomes lodged in the urethra or may occur when one ureter is occluded, the sound kidney being reflexly affected. This symptom in a great many cases has called the mother's or the physician's attention to the urinary tract. When children have not passed urine for several hours or days, the introduction of an urethral catheter may be impossible because of obstruction in the urethra caused by a stone. In many instances, a diagnosis had not been made until urethral catheterization had been attempted.

Frequency of urination, as would be expected, was reported more often with bladder and urethral stones (fifty and forty-eight per cent) than was found with renal or ureteral stones (thirty and thirty-nine per cent).

Nausea and vomiting which is a very indefinite symptom, when one is considering children or infants, was reported in ten per cent with ureteral stones, and four per cent with renal stones. With bladder and urethral stones, nausea and vomiting was not noted.

Tumor. Kidney enlargement or the formation of a tumor, was a very inconstant finding. We were unable to estimate the number of patients with tumor.

DIAGNOSIS

In the young infant, the diagnosis may be difficult. Sudden, prolonged abdominal pain, most frequently without warning, without diarrhea and with or without gross hematuria in an infant who has had no recent gastro-intestinal upset, should make one suspicious of renal or ureteral stone. With bladder or urethral stone inability to urinate, or continuous, frequent and painful urination with blood in the urine is found in the majority of patients. The location and radiation of the pain may be helpful but cannot be relied upon. The presence of tumor, which is rare, may assist in the diagnosis. Tenderness may be elicited over the affected side.

The x-ray will assist in the diagnosis and should always be used. In one hundred and twelve instances in two hundred and three reports, stones were discovered by the x-ray. Tiny stones may be missed but the majority will make a shadow on the plate or film. The finding of bits of gravel in the urine or urethra clinches the diagnosis. Urinalysis is usually difficult and may be negative but should be made, as the finding of blood or pus cells assists in the diagnosis.

Cystoscopy although difficult, can be done in very young children. Girl babies of six months have been cystoscoped with the separation of the urine. In young infants a rectal injection of ten to fifteen grains of chloral hydrate produces sound sleep which is as satisfactory as an anesthetic. Children remain quiet and suffer little pain so that ureteral catheterization and pyelograms may be made when necessary. We have successfully cystoscoped and catheterized boys of five years of age. A double pyelogram was done in a boy of eight. In boys a small instrument which has a small beak can be used with little trouble. Great care should be exercised as the urethra is easily torn, and when such an accident occurs a stricture will usually follow. It is advisable to split the meatus, which will greatly assist in the safe passage of the instrument into the bladder. Cystoscopy should be done whenever possible together with the catheterization of the ureters. Sixty-seven of the two hundred and three patients herein reported were cystoscoped. We have repeatedly noticed the large calibre of the infant's ureter when compared with the bladder and urethra. The largest catheters can be passed with ease. This observation has been made in the normal infant as well as in those having stone or infection.

A diagnosis was made from clinical findings alone in twenty-two instances. Rectal examination should never be overlooked. The ureteral stone found in one of our patients was easily palpated per rectum.

TREATMENT

Early surgical removal should be practiced, when the stone does not progress or when an

emergency exists. When patients are too small to permit of cystoscopy, x-ray, or ureter catheterization together with functional tests, exploration should be done first to determine the presence of both kidneys and, second, to remove the stone or stones. Bilateral lithiasis, especially when the stones are small, multiple and in the cortex of the kidneys, should not always be treated surgically. The removal of cortical stones does not remove the cause of their formation, so that the amount of destruction necessary to remove them should be weighed against the destruction being caused and the probability of the stones finding their way into the pelvis and passing through the ureter. In this series, sixty-nine per cent of stones were found in the bladder. A careful study of the histories that we have collected indicates that the majority of urinary stones found in the bladder except in the presence of urethral obstruction, bladder deformity or spinal cord lesion, originate in the kidney.

One hundred and fifty-five patients were operated upon. In three, the stones passed per urethram and effected a cure. In nine patients, the stones were probably passed, although they were not recovered. In ten, treatment was refused. In twenty-four patients, there was no report as to treatment. In our opinion the surgeon should not operate on kidney or ureteral stones in infants unless it is definitely determined that the stone will not progress or is causing damage, as most of them will pass as far as the bladder.

Cystotomy or cystoscopic removal can be done with much less trauma to the patient than an operation for the removal of a kidney stone or an ureteral stone. In this series, we find that seventy-eight per cent of the operations which were done for the removal of urinary stone were cystotomies, urethrotomies or some type of manipulation, or cystoscopic removal.

Post operative and medical treatment should consist of the early removal of all possible foci of infection. A careful diet should be followed together with the correction of over alkalinity or acidity of the urine so that it will not contain an over abundance of solid substances. Plenty of good water should be given which should not contain above the average of salts. A careful hygiene should be maintained so that the child is protected from infections and trauma.

CHART II

Cystotomies	Ureterotomies	Pyelotomies	Nephrotomies
77 suprapubic 4 perineal	5 primary 1 preceding nephrectomy	8 primary 1 bilateral	6 primary 2 bilateral preceding nephrectomy
Nephrectomies	**Nephropyelotomies**	**Meatotomies**	**Urethrotomies**
4 primary 1 following ureterotomy 1 following nephrotomy	1 primary 3 bilateral	11 primary	2 primary

Thirty-two cases of manipulation or crushing through cystoscope, etc.

PROGNOSIS

A large number of the reported cases of lithiasis in infancy and childhood were discovered at autopsy. In only two of our patients, diagnoses were made at autopsy. In Collin's report forty-three per cent of the patients with urinary stones were discovered at post mortem; ninety-two per cent of these under five years of age occurred before the second year, indicating a high early mortality. Kidney stones can be present for years without materially affecting the function of the kidney. As the infection increases, however, the kidney may be quickly destroyed. Bilateral involvement is very frequent. American and foreign authors report sixty-five per cent and fifty per cent. In our series, bilateral stones were found in thirty-three per cent. Early diagnosis, together with proper treatment before kidney destruction takes place, will save many kidneys and possibly a few lives.

The results of treatment are as follows: one hundred and one, or fifty-four per cent, were reported cured; ninety-five, or forty-seven per cent, were not reported; five, or two and one-half per cent, had recurrence of symptoms and two died.

MORTALITY

There was an operative mortality in this series of six-tenths per cent. We are unable, however, to trace many of the patients reported over a long period of time.

CONCLUSIONS

1. Urinary lithiasis is frequent in childhood and infancy, the average occurrence in the three large series reported being forty-three per cent;

the average age is seven and eight-tenths years. The youngest patient in this series was ten months old.

2. We are unable to determine the etiology of urinary stones in infants, although in our opinion infection is one of the factors.

3. In twenty-one per cent of our cases stones were found in the kidney or ureters. The comparison of right kidney to left is as twenty-one to eight. Only eight per cent were arrested in the ureter. Sixty-nine per cent of stones were found in the urethra or bladder. A large number of these had their origin in the kidney.

4. The symptomatology in the order of occurrence is as follows: (1) pain and colic; (2) hematuria; (3) frequency; (4) pyuria; (5) dysuria; (6) nausea and vomiting.

5. Cystoscopic examination can be made in very young infants. The size or age of infants should not be contraindications.

6. The infant ureter is proportionately large, is capable of great distention and facilitates the easy passage of stone.

7. The diagnosis is made from the following positive findings: (1) x-ray (fifty-five per cent); (2) urinalysis (fifty-two per cent); (3) cystoscopy (thirty-three per cent); (4) clinical findings alone (eleven per cent).

8. Surgery is indicated when stones do not progress through the urinary tract. Seventy-eight per cent of operations were done upon the bladder and urethra. When renal stones are bilateral, surgery should be carefully considerd.

9. The prognosis is unusually good. In this series, there were two deaths, one with bilateral stones the other occurring in conjunction with urinary malformation; fifty per cent were reported cured; two and one-half per cent had recurrence of symptoms and forty-seven per cent were not reported.

10. Urinary stone in children may remain symptomless for many years. In one of our patients, ureteral or bladder stone had been present for eight years with slight symptoms.

11. Stones discovered during adult life may have their beginning during childhood or infancy.

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DISCUSSION

DR. ARTHUR N. COLLINS, Duluth: I wish to express my appreciation of this opportunity of listening to the very valuable paper of Drs. Thomas and Tanner on urinary stone in infants. They should be highly commended for bringing to us the results of their extensive and painstaking survey of the literature on this important subject and for their careful and instructive analysis of the material facts.

I wish also to acknowledge with pleasure their compliment paid my modest contribution to this subject some eight years ago. At that time I reported the case of an infant of sixteen months with multiple stones in the urinary tract, and I have repeatedly besought my pediatric friends to be on the lookout for calculi in infants and children and to follow up their cases of infections in the urinary tract with the x-ray and the microscope.

The authors, by dint of much industry, have accumulated reports of 203 infants or children with urinary lithiasis. This is a goodly number and quite sufficient for a few tentative conclusions for the guidance of those interested in this subject. It is interesting to note that they found 155 males to 45 females, or about 3 to 1. In the series of 322 cases which I collected the proportion was about 2 to 1.

A valuable bit of information is contained in the fact that in their series 69 per cent of the stones were in the lower urinary tract, and that but 8 per cent were in the ureters. The utility of the fact is spelled in better surgical prognosis. These stones are easier of attack in the lower tract.

Several authorities have expressed the opinion that stones discovered in later life have their origin in infancy or childhood.

The case reported by the authors is evidence of such contention. I have just recently seen a case in consultation with Dr. Scherer, a little girl of about 9 years having a renal stone with symptoms dating some time back.

I am glad to see a more promising note in the surgical aspect of this subject. Eight years ago I found comparatively few successful surgical reports. Drs. Thomas and Tanner report 155 patients operated upon and a mortality of but .6 per cent. This is indeed gratifying. A large proportion of this advance is due to the skillful use of the cystoscope and of crushing operations. Seventy-eight per cent of these operations were cystotomies, urethrotomies or some type of manipulation, or cystoscopic removal. About 28 of them were operations upon the kidney itself. It would be interesting to know the separate mortality of this type alone.

Stone cases in infants and young children should receive careful vigilance. Unless the calculi are discovered earlier and removed promptly the mortality will remain high. There is a delicate point resting uncertainly between waiting for the stone to advance along the tract and the decision upon surgical removal, which should be constantly in the mind of the surgeon. Delay in surgical removal should not be continued to the point where destruction of kidney substance progresses to cripple the organ, or infection becomes a grave complication.

DR. GILBERT J. THOMAS, Minneapolis, (closing): We have seen at the University Hospital and in our private work six or seven cases of urinary lithiasis in children, and the reason for writing the paper was that most of the cases were undiagnosed. They were sent in for other conditions. An x-ray examination was rarely made to determine the existence of a stone, and in only one case was a stone suspected. Cystoscopy was not thought of. The two cases reported as fatal were both operations on the kidney, one of which was for bilateral stones. The other case was a kidney malformation.

In answer to Dr. Collins' question our reports show that the only mortality was from operations on the kidney.

A REPORT OF FIVE CASES OF SO-CALLED ACRODYNIA

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Several reports have appeared recently of an obscure disease affecting infants and young children. Weston, who published the first report named the condition "acrodynia," first described in 1828.[4]

During the summer of 1921, five children suffering from a malady resembling this disease were observed in the Mayo Clinic. Histories of these patients are reported herewith:

HISTORIES OF CASES

Case 1. (A362034). W. S., a boy, aged twenty-one months, was brought to the Clinic June 21, 1921. The child had been breast-fed for twelve months, and thereafter, had been fed a general diet, including meat, potatoes, butter, bread, and milk. About six weeks before, the mother had noted a change in the child's disposition. He had become restless, and peevish; he had cried a greater part of the time, and slept very poorly. A short time later, an eruption appeared on the body. He scratched violently, knocked his head against the floor and bed, pulled out his hair, and slept in grotesque positions. Small white sores had appeared under the tongue and the eyes had become sensitive to light. Two weeks before, the fingers and toes had become reddened and swollen; this was followed in a few days by scaling. His appetite had remained good, although he had lost 5 pounds in weight. He had not walked since the onset of the symptoms.

On examination the child was drowsy, almost stuporous. His features were the prototype of distress and wretchedness; the head was bowed as if to avoid the light; the muscles were flaccid and he sat erect only with difficulty. A fine, thickly-studded papular eruption was distributed over the trunk and extremities. On the fingers and toes was a brown induration and intense erythema faded out toward the arms. Pressure over the tibia produced pain. A large shallow ulcer with a necrotic base, limited to an area 1.2 cm. in diameter, under the tongue extended in a few days to the gums of the lower jaw, resulting in a slough of the alveolar processes and a falling out of the four lower incisors. The conjunctivæ were deeply injected. The knee jerks were absent. An intermittent fever, with no other demonstrable cause than the sloughing ulcer was present throughout the period of observation. The hemoglobin was 61 per cent, the erythrocytes were 4,360,000, and the leukocytes 11,400. The urine contained a large amount of albumin. The Pirquet's and Wassermann reactions were negative. Roentgenograms of the extremities were negative. Cultures from the throat, eyes, and stool were negative.

He was placed on a general diet which he took well, and given cod liver oil and hypnotics for marked restlessness. He improved slowly but steadily.

Case 2. (A362318). V. M. H., a girl, aged two years, was brought to the Clinic, June 21, 1921. The child had been breast-fed and thereafter received a well balanced diet consisting of milk, cereals, and vegetables. She had always been constipated. In February, she had an obscure fever for two weeks with drowsiness and prostration; after that a period of well being. She became irritable, developed marked anorexia, and began to lose weight. A short time later, a persistent pimply rash over the trunk and extremities, and a marked pruritus of the hands and feet appeared. Rubbing the soles of her feet quieted her. She had sweated excessively and complained of pain when lifted, since the onset of the symptoms. She became very weak and unable to walk. She had lost 6 pounds in weight.

Examination revealed a wretched appearing, poorly nourished child, very irritable and crying constantly. The typical papular eruption was scattered over the trunk and buttocks, and about the groins was an intense erythema accompanied by a coarse desquamation. The fingers and toes showed a fine scaling and a few small superficial infections. The hands and feet were constantly moist with perspiration. Pressure on the abdomen and extremities elicited tenderness. The muscles were soft and flabby. The reflexes were normal. There was an unexplained fever, intermittent in character and reaching 100. The hemoglobin was 89 per cent, the erythrocytes 5,740,000, and the leukocytes 18,200. The Wassermann and Pirquet's reactions were negative. Roentgenograms of the chest and extremities were negative.

The treatment consisted of forcing an ample general diet. The child improved gradually.

Case 3. (A360515). E. E. H., a boy, aged sixteen months, was brought to the Clinic June 24, 1921. The child had been breast-fed for one year. He had had a mild eczema, limited to the face during the first year and a severe attack of pertussis in February, 1921. In March, a spotted eruption had appeared on the hands and feet, which soon spread over the entire body; desquamation had followed in a few weeks. The condition of the skin had persisted, and had been accompanied by a very severe pruritus. The child had been extremely irritable and had slept poorly. He had pulled out his hair, rubbed his forehead on the floor and bed, and assumed queer and unusual postures. He had been soothed always by rubbing the soles of his feet. One week before, small white sores had appeared on the side of the tongue. During the course of his illness he had had a bilateral suppurative otitis media for two months, a severe diarrhea for three days, and a

slight unexplained fever on two occasions. He had been weaned very shortly after the onset of the illness and had eaten apple sauce, potatoes, butter, and milk. The mother stated, however, that his appetite had been poor. His muscles were weak, and he had evinced no desire to stand or walk. He had lost 5 pounds in weight.

At the time of examination the child was irritable, and restless. Patches of fine, red, thickly studded papular eruption were distributed over the trunk and extremities. Palms and soles were desquamating in fairly large flakes. The muscles were flabby and relaxed but the reflexes were exaggerated. The mucous membranes of the mouth were slightly reddened and injected, and on the side of the tongue was a shallow ulcer about 1 mm. in diameter, with a white base. The hemoglobin was 66 per cent, the erythrocytes 4,110,000, and the leukocytes 13,900. The polynuclear neutrophiles were 62 per cent, lymphocytes 22 per cent, large mononuclears 4.5 per cent, transitionals 9.5 per cent, eosinophils 1.5 per cent, and basophils 1.5 per cent.

The child was placed on a forced general diet and cod liver oil. His appetite soon became excellent, the skin cleared markedly, and he gained 1.5 pounds in three weeks.

Case 4. (A363028). R. H., a boy, aged sixteen months, was brought to the Clinic June 29, 1921. He had been breast-fed for nine months, then placed on a general diet, including milk, oatmeal, eggs, butter, toast, and a small amount of vegetables. He had had frequent acute respiratory infections. He had been extremely constipated. The onset of the condition occurred in April, 1921, with photophobia, peevishness, almost constant crying, and the apearance of a pimply eruption over the body. Shortly afterward his feet and hands began to itch. He could always be quieted by rubbing the soles of the feet. Desquamation had been observed for about six weeks. He bit his hands and tore out his hair. He took very little food except about 20 ounces of milk daily. He had lost 10 pounds in weight. He was exceedingly irritable, markedly emaciated and he had a constant pitiful whine. All the muscles were extremely flabby and relaxed. The typical papular eruption covered the body, except the face. The fingers and toes were slightly red and swollen and had a coarse desquamation over the terminal phalanges. The mucous membranes of the mouth were slightly injected. The reflexes were normal. The Wassermann and Pirquet's reactions were negative. Roentgenograms of the extremities were negative. The hemoglobin was 72 per cent, the erythrocytes 4,600,000, and the leukocytes 10,700. The polynuclear neutrophiles were 41.5 per cent, lymphocytes 47 per cent, large mononuclears 7 per cent, and eosinophils 4.5 per cent.

The child was placed on a general diet and cod-liver oil. He improved slowly.

Case 5. (A366530). H. B., a boy, aged eighteen months, was brought to the Clinic July 29, 1921. The child had been breast-fed for nine months, and thereafter, had received food from the family table, apparently a well balanced, ample diet. He had had pertussis in July, 1920, and bronchitis of moderate severity in February, 1921. The onset of the present illness had occurred eight weeks before with loss of appetite and the appearance of a rash first on the face and later over the entire body. Itching from the first appearance of the rash was most intense. For four weeks the child had been very irritable and had slept poorly. He had been weak and had remained in bed with his head buried in the pillow most of the time, as if his eyes were sensative to the light.

The child was very poorly nourished and all the muscles were extremely flabby. Over the chest, forearms, and abdomen were dense patches of pinpoint papules showing fine desquamation. On the distal phalanges were large scaling patches.

He was placed on cod-liver oil and a general diet. Definite improvement occurred.

DISCUSSION

The outstanding features in these cases were the manifestations of the skin and nervous system. Marked loss of weight occurred in each case. All the muscles were soft and flabby and the patients so weak they could not stand unsupported. Two of the five sweated profusely.

Before the onset of the disease the children had been happy and normal. They became peevish, restless, and irritable; cried a great deal and slept poorly at night. Their wretched, anxious, and worried expressions bore out the truth of the history. Two of the children beat their heads against the floor or the bed to a point of alarming injury. They bit their fingers and rubbed them on their teeth so that the hands became macerated and infected. Three pulled out their hair. Two slept in various grotesque positions. Four were intolerant to light. Two were definitely tender to touch over the body. The knee jerks were variable; normal in three, absent in one, and accentuated in one.

All the children had a fairly profuse papular eruption over the trunk and extremities; the papules were light red, pin-point, and closely studded, usually occurring in patches. Itching varied from moderate to maximal severity. In three of the children, the papular rash extended to the fingers; in the other two erythema was diffuse, gradually fading toward the arm. There was a variable amount of doughy swell-

ing of the fingers and great toes. None of the children had the extreme erythema, swelling, and cyanosis which has been reported by other observers. Small superficial pustules were present on the fingers of two infants and one child developed a severe infection of the great toe. All desquamated medium sized flakes; some had scaling over the trunk. The pruritus on the palms and soles surpassed that of any other part of the body. Three of the children could be quieted, no matter how restless, by rubbing the soles of the feet.

The mucous membranes of the mouth were slightly reddened in all. A large shallow ulcer, with a necrotic base, was found under the tongue of one child; it extended to the gums of the lower jaw resulting in a falling out of four incisors and sloughing of the maxillary processes. One child had a small ulcer of similar character on the tongue; another had a moderate gingivitis.

Except for a transient attack of bronchitis in one infant the cardio-pulmonary system was negative in all cases.

Three of the children lost their appetites; one ate fairly well; the one most severely ill had a good appetite; he had, however, lost 5 pounds in weight. The children had been breast-fed to nine months or beyond and had thereafter received a well balanced diet up to the time of onset of symptoms. Two of the children had been markedly constipated before the onset of the symptoms. One had diarrhea for a few days.

One child had large amounts of albumin in the urine; one had had pyelitis during the course of the illness.

All of the children had had a low grade fever during most of the illness. Cause for the pyrexia was demonstrated in only two of the five.

None of the children were markedly anemic. One had an unusually high erythrocyte count and hemoglobin reading, perhaps owing to a blood concentration; this same child had leukocytosis. The three others had only a moderately increased leukocyte count. The Pirquet's and Wassermann reactions were negative in all. Roentgenograms of the extremities obtained in three cases were negative.

SUMMARY

It seems hardly justifiable to ascribe to "acrodynia" the peculiar malady from which these five children were suffering. The acuteness of the symptoms and the highly contagious character of the epidemic in Paris[4] are in contrast to the chronic course and the very mild contagious character of the disease of the patients under our observation. Moreover, there have been no reports of the disease in adults during the past few years, whereas, during the Paris epidemic, no mention was made of the disease attacking infants and young children. There are, on the other hand, some points of resemblance; namely, the paresthesias and wasting and erythema of the extremities. However, there can be little question of the similarity of the disease under our observation with that described by Weston, Byfield, Miller, Cartin, Brown, and others.

The possibility that food deficiency may be a cause of the disease has been suggested, but in our patients there did not appear to be any fault or demonstrable defect in the diet. All of the children had been breast-fed and after weaning, had been placed on an ample well balanced diet. The therapeutic response to forced feeding cannot be interpreted as a result of supplying lacking accessory food factors. There is no reason to suspect any connection with pellagra.

Except for a temporary bronchitis and a transient otitis media, no demonstrable infection occurred; moreover, in the past history, there was only one instance of a susceptibility to upper respiratory tract infections, and the onset of the disease did not occur with a cold. We cannot, therefore, subscribe to the suggestion of Byfield and Brown that infection of the upper respiratory tract is important as an exciting factor.

The marked irritability, restlessness, sleeplessness, trichotillamania, and definite changes in disposition are symptoms which we are in the habit of associating with a cerebral irritation. The excessive itching of the extremities and the gnawing of the hands, suggest the existence of paraesthesias which have been described in older children. It was striking that gentle stroking of the soles of the feet was sufficient

in three of the five cases to allay the irritation and induce sleep. It is evident, that whatever the irritation of the nervous system, it is of transitory character and does not leave lasting injuries.

Although the five children were examined within a period of five weeks during June and July, the onset occurred between March and May. This is in contrast to the records of the children reported by Byfield. In his series the onset occurred in the majority of cases during the winter months. As the children under our observation came from three different states (Minnesota 2, South Dakota 2, Missouri 1), it is unlikely that local conditions are responsible for the disease, although Byfield described a number of cases seen in and about Iowa City. Local physicians in charge of these children previous to our examination said that they had never seen similar cases.

Note: These cases were studied at the suggestion of Dr. Helmholz, Head of the Section on Pediatrics, Mayo Clinic.

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ACUTE INTESTINAL ILEUS*

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Although during the past ten years very definite advances have been made in the diagnosis and treatment of acute inflammatory processes in the abdomen, and the reduction in mortality commensurately improved, very little progress has been made in the handling of cases of acute intestinal ileus.

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Edward Richardson recently published two series of cases, one for a period extending from 1898 to 1907 and the other from 1908 to 1917. For the first series his mortality was 60.4 per cent and for the second 41.5 per cent. This is quite an appreciable reduction in the mortality, to be accounted for by the more prompt interference in the last series in cases where strangulation ileus occurred as a post-operative complication in patients who were still in the hospital.

Codman recently reported a very unusual series of 27 cases, with no operative mortality. This series gives a false impression because it includes several cases of chronic intestinal obstruction from new growths. These should not be confused with acute ileus. Codman accounts for this remarkable series by the fact that he has operated upon a sufficient number of cases so that now he knows how to treat them.

As to the pathology of this condition, there are various mechanical conditions that may produce acute intestinal obstruction. The common ones are known to every one and the literature teems with bizarre and weird cases. These mechanisms we will discuss only in general. The important factor in all cases of acute ileus is the sudden stoppage of the stream of intestinal contents. This may be due to occlusion of the lumen of the bowel, either from the sudden impaction of a foreign body, which is extremely rare, or to constriction or strangulation of a portion of the bowel; in other words, some sudden mechanical obstruction of the lumen. The second type is due to the sudden cessation of the propulsive force, a dynamic or paralytic ileus, from a permanent or prolonged injury to the neuromuscular mechanism of the intestines, as is seen in acute peritonitis or in mesenteric thrombosis.

Surgical therapy is indicated in both types and both types may co-exist in the same patient. When the intestinal lumen becomes occluded the peristaltic effort is increased to overcome the obstruction, and gradually from the accumulation of fluids and gases in the portion of the bowel oral to the obstruction, this portion of the bowel becomes distended. As a dilated heart loses its contractile force according to the cube of its dilation, so the intestine loses its

contractility in about the same ratio when it becomes distended. It is easy to conceive, therefore, of the intestine becoming so distended as to permanently lose its power of contraction, causing a paralytic ileus in that portion of the intestine above the obstruction.

With the stoppage of the flow of the intestinal contents a very definite change takes place in the chemical processes in the obstructed portion. A very toxic substance is elaborated and this, if it is absorbed in a sufficient quantity, causes death. There has been a great deal of speculation as to the character of this material and the chemical mechanism by which it is produced. Some time ago Whipple, Stone and Bernheim did some work to prove that this substance was a nitrogenous body formed by the perverted activity of an injured, or in some way changed, intestinal mucosa.

It has been shown that the toxic manifestations of acute ileus are not due to the absorption of substances normally existent in the intestine, but that a definite and new substance is elaborated, also that it is not necessary to have a lesion of the mucosa for the elaboration of this toxic substance, and that microorganisms are necessary for its production. In order to prove this, Dragstedt and his associates made isolated, closed, intestinal loops which they tried to sterilize by thoroughly washing out the lumen with water and ether before they were closed. They found it impossible to produce a sterile condition of the bowel by such a procedure but they did find that the material developed in such isolated loops was less toxic when injected into animals than the material from similar groups not so treated.

The exact nature of this toxic body is not known, but it is known that bacteria are necessary for its production and the organisms found in the obstructed intestine are always of the protein splitting or "B" coli groups. Dragstedt and his associates have shown that the intestinal flora in rats could be modified by feeding them strictly on carbohydrates, so that the predominating organisms would be of the lactic acid type to the exclusion of the coli growth. If in such rats an intestinal obstruction is produced the protein splitting type will develop to the complete exclusion of the lactic acid type.

Whipple, Stone and Bernheim have shown that there is a marked increase in the blood nitrogen in all cases of intestinal obstruction. They take this to mean a nitrogen retention from a renal insufficiency.

Rabinowitch has recently published an article, wherein he states that cases of intestinal obstruction show an increase in blood urea, with an apparently normal or higher than normal output from the kidney, and with a functioning and anatomically normal kidney. These facts lead us to believe that the toxic body is a protein split product. It is important to associate these facts in the interpretation of the symptoms of intestinal obstruction.

One must consider the symptomatology of ileus as a fairly fixed syndrome, and it is on the intensity of these symptoms and their duration that we base the type of operation performed, and not so much on the mechanical conditions that have caused the ileus; in other words, you are not operating on a volvulus or strangulated hernia, but on a case of intestinal obstruction of a certain duration in a known portion of the bowel.

There are very few operations that require any special degree of surgical acumen or judgment after the diagnosis has been made, merely a certain technical ability to do a definite and accepted procedure that has been properly standardized; but the operator who attempts to carry out a finished technical procedure in cases of intestinal obstruction is going to have a very high mortality. I have attempted to standardize in my own mind the technic of these cases, but it is far from satisfactory.

The cardinal symptoms of obstructive ileus are cramp-like or colicy pains. This is the type of pain that occurs with hyperperistalsis of any hollow viscus, such as the ureter, renal pelvis, gall-bladder, and uterus; and the intestinal type is to be differentiated from the others by the diffuse character of the pain which the patient will himself describe as being "in his bowels", and is associated with a feeling that his bowels should move. He will often describe the pain as being similar to the cramp-like pains that follow the taking of a drastic cathartic. It is not unusual to first see the patient with a strang-

ulation ileus straining at stool. The pain is progressive, that is, the remissions of periods of freedom from pain gradually become shorter until the pain is almost continuous. The next most important symptom nearly always present is vomiting. The vomiting is not a toxic manifestation but probably a mechanical one and can only be satisfactorily explained by reversed peristalsis. Almost simultaneously with the onset of complete obstruction, this symptom begins. The following case illustrates very well the fact that this reversed peristalsis is a mechanical and not a toxic feature of the condition, also that the toxic manifestations are due to bacterial growth in the intestine; and if such a thing as sterile intestinal lumen were possible, the toxic features of intestinal obstruction would not be present. Attempts to produce a sterile condition in the intestine have not been successful, but experiments have shown that the toxic features were much less obvious where the number of protein splitting microorganisms could be materially reduced in the intestinal lumen.

Recently this case came to my notice. The patient was a new-born baby, forceps delivery, weight 8 pounds, and immediately after its first nursing vomited milk, and very shortly vomited meconium. This vomiting of meconium persisted and nothing was passed by rectum. Gradually there developed marked distention of the abdomen and a diagnosis of intestinal obstruction was made. A catheter could be passed about two and one-half inches into the rectum but no further. The child was watched for about twenty--four hours and although it vomited constantly and took no fluid, its physical condition was not bad. Between its attacks of vomiting it looked like a normal baby. The pulse was normal and there was apparently no shock. At the end of twenty-four hours a laparotomy was performed and an extensive exploration made which took over an hour. We found that the ileum, instead of emptying into the cecum, ended blindly at the umbilicus; in other words, there was a continuation of the omphalomesenteric duct. The cecum was represented by a small nodule without any lumen. From this point on the large intestine was represented by a narrow cord. An attempt was made to anastomose the distended ileum to a portion of this colon where there was a small lumen, but the futility of correcting the condition was very soon apparent. The wound was closed and the child died five hours later.

The interesting part of this whole picture was that in spite of a long, rather rough manipulation, the child recovered from the operation and stood it quite well, but died a few hours later, and never once from the time it was born did it show the picture that is usual in the case of complete obstruction of the ileum. I think this is explained by the fact that we had here an unusual condition of acute intestinal obstruction with a sterile condition of the intestinal lumen.

The vomiting in intestinal obstruction usually begins with the onset of the pain. Then there is a remission of this symptom for quite a period after the initial attack, when it again recurs with definite regularity, the intervals between attacks becoming shorter, until the vomiting is almost continuous. The vomitus consists of gastric contents and later of a large amount of bile stained fluid, with evidences of material ejected into the stomach from the small intestine. This material is yellowish, of the consistency of pea soup, and has a peculiar alkalin odor. Although the character of the material does not change a great deal, the odor becomes colonic and often gives the impression of having been ejected from the large bowel. The odor is probably due to the activity of protein splitting ferments in the upper bowel. With these symptoms there may be a bowel movement, which may even be watery in character. Later there may be some passage of blood. After this there is absolute obstipation and no passage of gas, with progressively increasing meteorism. The pulse becomes rapid and the patient sinks into a state of collapse.

In cases of paralytic ileus, such as occur with peritonitis, either general or localized, or with severe trauma, the symptoms of ileus are often masked by those of the exciting condition. There may not be the colicy pain noticed in the obstructive type. In these cases we have the obstructive type of vomiting, gradually becoming more and more severe, with increasing meteorism, upon which to make the diagnosis of ileus. If such a condition is due to general

peritonitis it is probably not worth while to operate, but if it is due to a localized peritonitis it may be important to recognize the factor of ileus. Ileus may occur in cases of appendicitis with abscess formation and quite often it is not a real paralytic ileus but an obstructive type from the kinking of the small intestine where it is adherent to the inflammatory mass.

Handley describes a condition which he calls ileus duplex, in which a loop of intestine becomes obstructed, usually at two points where it is adherent to a pelvic inflammatory mass, the intestine becoming kinked at the oral and abnormal ends of the adherent loop.

In considering the symptomatology of ileus one must keep in mind the fact that the higher the obstruction the more violent are the symptoms and the more rapid the course of the illness. Whenever it is possible in cases of ileus the operative procedure should be performed under local anesthesia. Where there is intestinal vomiting or where large quantities of vomitus are ejected, it is important to thoroughly wash out the stomach before the operation. This serves two purposes; it gives the patient a period of freedom from vomiting, often of sufficient time to permit the surgeon to perform an operation without the annoyance of having the patient vomiting and retching.

If one is fortunate enough to see these cases before the portion of the intestine oral to the strangulation is much distended and the portion of the bowel strangulated has not been permanently injured, relief of the strangulation is all that is necessary. This is especially the case if the obstruction is in the lower part of the ileum. In cases where the symptoms are more violent, especially in vomiting and abdominal distention, if the abdomen is opened and it is found that the strangulated loop reacts after having been released, but that the intestinal wall above the obstruction is thinned out from over-distention and does not empty itself, we then have a condition of paralytic ileus from over-distention, and merely relieving the strangulation will not allow the intestine to empty itself. It is very important in these cases to do an enterostomy as high as possible with two objects in view: first, to empty the intestine of its toxic material, and second, to relieve the over-distention so that the musculature of the intestine will again be allowed to function, in this way obviating the possibility of a paralytic ileus from over-distention.

It sometimes happens in cases where the intestine is so distended, that in adapting itself to the abdominal cavity it becomes angulated at various points throughout its course. Opening the intestine will often relieve the distention between two such angulations but not beyond that point. If this occurs it is well to use Monk's procedure of threading the intestine over a rigid tube so as to empty as many of these sections as possible before the abdomen is closed. The tube is then sutured into the bowel to establish a temporary enterostomy. This is not an unusual condition and is often a reason for the fact that, although a large caliber tube has been sutured in the intestine, the distention remains and the enterostomy opening does not drain. The best index as to whether such a condition exists is the difficulty in closing the abdomen. If the intestine is thoroughly emptied there should be no difficulty in closing the abdomen. If one attempts to close the abdomen by brute force while the intestine is still distended there is likely to be a persistence of the obstruction, by increasing or making more obvious these angulations, and the trauma to the intestine is very likely to cause an adhesive peritonitis, fixing these angulations with adhesions. Where the strangulated loop is not viable or where there is a suspicion that it may undergo necrosis, that portion of the intestine should be resected; but we make it a rule never to do an anastomosis in acute cases. The suspected loop is lifted from the abdomen, the intestine above it emptied, and an enterostomy tube fixed at a point oral to the strangulated loop, or higher, if possible. The abdomen is then closed, allowing the injured loop to remain outside the abdomen. It is bad practice to bring out a loop with the idea of opening it at some later time. If the intestine is in such a condition as to require resection, there is always sufficient toxic material oral to the injured loop to require immediate relief by enterostomy.

The same principles hold good in the treatment of strangulated hernias. It is interesting

to note that when a right inguinal hernia does contain small intestine it is that portion of the intestine six or eight inches from the ileocecal valve, while the strangulated loop of ileum in a left inguinal hernia is usually a higher one and the symptoms are more severe. The most difficult strangulated hernias are ventral hernias where a high portion of the ileum is caught, and the difficulty of isolating the strangulated loop is often very great. The temptation to do finished surgery with the idea of curing the hernia and not having an enterostomy to complicate the operation, is often great; but such a temptation should be overcome. It is a great deal better to make an enterostomy where it is necessary, through the hernial wound, and repair this with the hernia after the patient has survived his acute ileus.

It is doubtful whether one can do anything for a patient with a paralytic ileus caused by a general peritonitis, but I believe it should be tried for the reason that there is a great liklihood of the condition being a localized peritonitis, which is amenable to treatment, associated with a mechanical ileus caused by angulations from loops adherent in the inflammatory areas. In such cases a rapid jejunostomy done under local anesthesia will often save the patient's life. We have seen several cases of localized peritonitis with abscess formation, in which the predominating symptoms were those of intestinal obstruction. In such cases one should devote his energy, first, to the treatment of the intestinal ileus and, next, to the inflammatory process. To quote the case of a young man twenty-six years of age, who was taken with pain in the abdomen, fever, and vomiting. These symptoms gradually abated, but on the fourth day after his illness his temperature again arose, he began to vomit, and his abdomen became distended. Enemata did not relieve the distention. He was vomiting large quantities of fluid and was in considerable shock. His temperature when we saw him was 100.4° and he was definitely tender in the right lower quadrant. A median incision was made. The small intestine was found to be tremendously distended, purplish in color, and projected from the wound. Exploration revealed a mass which could be felt extending from the region of the cecum into the pelvis, to which several loops of intestine were adherent. No effort was made to disturb these adhesions, but a tube was introduced into the dilated intestine and the wound closed about it. The mass which could be felt on rectal examination was opened through the rectum. The distention immediately disappeared and the patient made an uninterrupted recovery. About six months later his appendix was removed. I am convinced that any effort made to disentangle this intestinal mass would have resulted in the patient's death. The first operative procedure of draining the abscess through the rectum required less than ten minutes.

More recently a similar case came to our attention in which the predominating symptoms were those of ileus. This patient was over seventy years of age. He had very little pain in his abdomen but extensive meteorism, followed by vomiting. He was quite tender and slightly rigid over his appendix. The abdomen was opened and a partially gangrenous appendix with beginning abscess formation was found. The appendix was removed and a drain inserted into the abdomen. We thought of opening the dilated loop of small intestine, but because of having to work in an infected field we did not like to expose to infection a clean portion of the abdomen. This would have been necessary in order to accomplish this procedure, so it was not done. The symptoms of ileus did not abate and the patient died in a few hours, the typical death of acute intestinal ileus. The proper therapy in this case would have been to open the abdomen at a point distant from the inflammatory process, drain the intestine, and then drain the abscess through a separate wound, without making an effort to remove the appendix.

I do not mean that one should do an enterostomy in every case of appendicitis with abdominal distention and vomiting, but where the cardinal features of the case are those of intestinal obstruction, with the vomiting of large quantities of fluid and extreme abdominal distention, the serious illness is probably not the peritonitis but the intestinal ileus, and the ileus deserves first consideration.

Postoperative treatment of intestinal ileus

is very important. These patients are very much dehydrated from the constant vomiting. This in itself is probably an important factor in the intoxication and for a long time was thought to be the real cause of death, so it is important to give these patients fluids, preferably into a vein and immediately after the operation. It is almost impossible to give too great a quantity at one time, because as soon as the normal blood volume is established, unless the kidney function is impaired, fluid will be excreted almost as rapidly as it enters the circulation. If fluids are given beyond this point the blood volume will remain practically the same and the fluids will go into the tissue spaces and to some degree be excreted into the intestinal lumen.

Three or four years ago Crile did some work on the maintenance of blood volume by the injection of salt solution and found that the fluid was retained in the circulatory system for only a very short time, and that if excessive quantities were injected it went into the tissue spaces and a great deal of it was excreted into the intestinal lumen. On this basis I once injected an excessive quantity of salt solution into the vein of a woman shortly after operating upon her for acute intestinal obstruction, with very startling results. This patient was about sixty-five years of age and had had a strangulated left inguinal hernia of seventy-two hours' duration. Her pulse was extremely rapid and she was in very poor condition. Under local anesthesia I lifted out the strangulated loop, but the intestine was no longer viable, so I opened the bowel and inserted a tube into the injured loop, leaving the intestine outside the body. The distention subsided somewhat but the vomiting persisted and the artificial stoma did not drain. On the basis of what I had seen Crile do with animals, I gave this patient nearly 3 liters of salt solution into the vein. She passed a great deal of urine and very shortly (approximately three hours) fluid began to issue in large quantities from the stoma in the intestine. From that time on she began to pick up and in two weeks she had sufficiently recovered to enable us to close the enterostomy opening and repair the hernia. I presumed the excessive fluid was secreted directly into the intestinal tract. Experiments done since then on animals have not turned out so satisfactorily.

SUMMARY

(1) Clinical experience substantiates the most recent experimental work done.

(2) The grave symptoms of intestinal ileus are probably due to the activity of protein splitting ferments.

(3) Successful surgery depends upon relieving the ileus as early as possible and postponing any reconstructive surgery for secondary operation.

(4) Large quantities of fluid, given preferably intravenously, diminish the toxemia probably to a degree by being actually excreted into the intestinal tract.

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DISCUSSION

DR. E. E. FARR, Minneapolis: Dr. Zimmerman has covered the main points in relation to this subject, and discussed some of the mooted points which I do not wish to take up. Provided the line of treatment he has given us is to be carried out, there are certain technical points which are always difficult when one of these cases comes to operation. The anesthetic is an important feature in these desperate cases, and we need every artifice that will meet the handicaps under which we are working. Under local anesthesia the technical handicap is greater, as far as carrying out of the operation is concerned, provided we do anything more than an enterostomy. What are we going to do with the cases that are extremely bad? Some are so sick that general anesthesia is out of the question and local anesthesia is demanded. Provided a small loop of non-distended bowel can be picked up, this may lead to the point of obstruction and evisceration may not be necessary. As a rule, however, in these cases the intestines will protrude

as soon as the abdomen is opened. They cannot be held in. These patients should be given preliminary hypodermics of morphin and magnesium sulphate, and the distress produced by the intestines lying outside the abdomen is not marked, provided extremes of temperatures are avoided when placing the packs about them. In these cases we use rubber towels, making the incision through a piece of rubber which is attached to the skin. Beneath this rubber one may place sterile hot water bottles. The intestines are allowed to come out upon the rubber towel, and may be evacuated by drawing a small knuckle of bowel through a one-inch opening in another rubber towel. The contents of the intestines may be aspirated by this means, the purse string tied, and the bowel washed off by pouring salt solution over it, without contaminating the sterile field. The assistant, with hands beneath the second rubber towel, may milk the fluid from the intestines. We sometimes fill the Pneumatic Injector with salt solution, introduce it into a second loop of bowel, and in this way several feet of intestine may be irrigated, getting rid of toxic material. We have had a number of cases recover, though they were cyanotic when they reached the table. In doing an enterostomy we have no hesitation in using catheters for drainage in several separate loops.

DR. A. E. STRACHAUER, Minneapolis: The indications for the evacuation of the bowel content above is well brought out. The fact that the higher the obstruction the more severe the symptoms is also well appreciated. However the higher we go in the intestinal tract the nearer we come to sterile content of the small bowel, so I should rather question the explanation that the symptoms are due to the activity of bacteria.

DR. F. A. DUNSMOOR, Minneapolis: I think this is a paper which calls to mind the seriousness of abdominal obstruction. Some time ago I was visiting the Boston City Hospital, and found that in their reports for obstruction of the bowel although operated upon, all cases approached a 50 per cent mortality. This seemed to be quite surprising and I followed it up in other hospitals I visited. I found that that figure hasn't been changed so very much. Taking the good and bad cases, and for whatever cause, altogether those which have been operated upon have had about 50 per cent mortality. What the doctor has mentioned about emptying thoroughly above the obstruction, I believe should be supplemented. If this bowel did not empty, then open the intestine as high as possible above this and irrigate directly through and out near the obstruction. Then follow up with stimulants. This is one place in which I like to see whiskey put into the inside of the intestinal canal.

Another point is in regard to the administration of fluid which the doctor asks after operation. I believe that if we wish to make this work more satisfactory, we should put that fluid into the patient's veins before operation. If impossible to put it into the vein put into the tissue or abdomen. I am confident that those procedures are indicated as clearly as any in the practice of surgery.

DR. A. E. BENJAMIN, Minneapolis: I think that the question of the best treatment for acute obstruction of the bowel has not been solved because the mortality rate is too high at the present time. However in these cases which I have diagnosed as acute obstruction, if I could demonstrate that it was single I have attempted stomach lavage. This is repeated every two or three hours constantly for two, three, four or five days. The results have been remarkable. We wash out the stomach with bicarbonate of soda solution and then emptied the bowel from below. It is surprising what results we can get especially if we can get the patient to retain mineral oil, which will gradually seep down through the intestine. The operation can then be performed and the obstruction relieved. I agree with Dr. Farr that where several loops are found distended, opening up these loops is an advantage, although most of these cases, as desperate as they are, will die. Very few will live. We find that where there is gastric distention there is extreme restlessness that is apparently not due to the obstruction alone. This distention produces pressure upon the heart. There seems to be a toxemia which cannot be entirely explained which produced the poison that has such effect upon the nervous system. These cases you have all seen.

DR. FARR: When do you give the mineral oil?

DR. BENJAMIN: Just as soon as the patient can keep it down.

IMPORTANT POINTS IN DIFFERENTIAL DIAGNOSIS OF GASTRIC ULCER AND CARCINOMA*

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While the literature in this field is limitless, the important phases of gastric ulcer and carcinoma can be summed up in a short paper and I will endeavor to give only the essentials and leave out the multitudinous details with which ulcer and carcinoma are encumbered, in the ordinary text-book handling of the subject.

When a patient presents himself with a supposed gastric lesion, we first verify the presence of a lesion. In a very high percentage of gastric cases the lesion will prove to be ulcer or carcinoma. It is ordinarily quite easy to determine the presence of a lesion but oftentimes

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extremely difficult to say whether it is malignant or nonmalignant.

All cases are put through a definite routine, up to a certain point, which includes an exhaustive history, general physical examination, blood and urinary examinations, and either a one hour or fractional gastric test meal. If the one hour test meal shows any marked deviation *below* the normal the patient is later put through a fractional test. The reason for this is that the one hour test may show a very low secretory activity while a test running every fifteen minutes for two and one half hours to three hours may show a latent secretory power approaching or up to the normal. The curve may start after the one hour period and reach its climax at two hours.

After the stomach has been emptied a barium meal is given and the morphology, tonus, peristalsis and mobility is studied. We find it more convenient to make this examination on the first filling of the stomach and have the patient report back in six hours for a motility check up. It also saves the patient taking two meals. During the barium full stomach study it is determined whether films are necessary, either as a matter of record or to check up suspected areas for defects. Ordinarily we are satisfied with the screen readings and only take films in about one out of four cases. With thick patients and where there is a doubt existing as to the accuracy of the screen reading, the films are necessary.

I will now discuss the essential diagnostic points of gastric ulcer and gastric carcinoma on a differential basis. Gastric ulcer of the acute perforative type is not included as the history, from our experience, is of little value. These statistics are from our own files which include some 500 gastric ulcer and gastric carcinoma cases.

GASTRIC ULCER HISTORY	CARCINOMA
Average age—15 years.	52 years.
Average duration of stomach history—14 years.	3 years.
Sex—Male 74, female 26.	Male 64, female 36.
Attacks—Usually attacks last weeks to months with varying periods of remission, sometimes of years; if complicated may be constant.	Constant.
Pain—Location — Epigastric and pyloric region.	Epigastric, when present.
Time—2 to 5 hours p. c. usually.	Immediately p. c.; 2-5 hours in ulcer type.
Type—Hunger pain, gnawing, occasionally lancinating.	Dull, sickening.
Radiation 0	0
Relieved by—Food, alkalies and vomiting.	Starvation or liquid diet; food and alkalies in ulcer type; vomiting.
Nausea and Vomiting—Frequently 4-5 hours p. c., on empty stomach marked relief.	Frequently the first symptom; very common.
Nutrition—Good until complications; weight loss in attacks with recovery in remissions.	Continued weight loss and later cachexia.
Appetite—Good until complications.	Poor, loss of appetite often first symptom.
Bowels—Usually unaffected or constipated if on bland diet.	Often achylic diarrhea.
Hemorrhage—40 per cent.	18.7 per cent.
Occult blood (gastric)—35 per cent.	60 per cent.
Total acids—70 points.	30 points.
Microscopic—Sarcinae in 90 per cent of retention cases.	Oppler-Boas in 60 per cent.

Roentgen Ray Study of Gastric Ulcer.

1. Visualization of a niche, occasionally with incisuria in same circular muscle zone, more often without.

2. Accessory pocket of chronic penetrating ulcer, very often with hour glass stomach.

3. A flat board-like line of stomach contour which is skipped by peristaltic wave as occasionally seen in large flat saddle ulcers.

Usually the roentgen ray hunt for gastric ulcer resolves itself into a search for a break or defect in the contour of the stomach wall. As we are looking at a silhouette, the patient must be rotated so that each sector of the stomach wall will be tangential.

It is impossible by the roentgen ray or any other method to determine when an ulcer is undergoing malignant degeneration. We have had a number of cases explored and stomach resections done where the surgeon could not answer this question from the gross pathology of the specimen. The pathologist made the diagnosis.

Roentgen Ray Study in Gastric Carcinoma—For the purpose of this paper I will classify gastric carcinoma into two types only.

1. Ulcers that undergo malignant degeneration.

2. Primary carcinoma.

1. Carcinomata that evidently developed from an ulcer base have already been discussed under ulcer. In the later stages of this type the roentgenray findings are the same as in those called primary carcinomas.

2. Primary carcinoma is demonstrated with roentgen ray by a filling defect in the contour of the stomach wall which is diametrically opposed to the niche of an ulcer, that is, the niche adds to the stomach map while a filling defect takes away. The lines or margins of a filling defect of carcinoma are usually characteristic, being of moth-eaten or finger-print character. This is what one would expect from the usual mode of carcinoma proliferation.

In earlier cases where the growth has not impinged on the lumen of the stomach and is only involving the wall, a condition similar to that obtaining in saddle ulcer is found, that is, a board-like section of wall which is skipped by peristalsis.

The filling defect of medullary carcinoma is found in all stages of development from a nodule the size of a pea up to the tremendous defects reducing the stomach map to less than half its normal area.

To illustrate some of the difficulties in the differentiation of gastric ulcer from carcinoma I wish to cite, in brief, four histories, and will give only the very essential pointis.

Case I. Male, aged 59, Russian Jew. Examined August 1916.

History: For ten years he had attacks of pressure pain under the ensiform radiating to the back under both scapula, lasting two or three months, coming on twice a year (usually in spring and fall). Pain in the attacks came on two hours after eating and lasted for a few minutes at a time until the next meal, with food and soda relief. The pain was always localized under the ensiform, never in the abdomen. He was slightly constipated. Five years before present trouble started, that is fifteen years ago, for nearly a year he suffered from attacks of severe crampy pains under the right costal margin, lasting a few hours. Weight 115—normal 135. Physical examination was negative except for spastic upper recti. Blood negative. Urine negative except for two and one-half per cent sugar in first specimen, never found again on repeated examinations—no blood sugar examination made. Three stools examined for occult blood two days apart, all negative. Gastric analysis: total acidity 6, free HCl—combined acidity 6; no food remnants; microscopic examination negative. Roentgen ray examination: large hypotonic stomach, subnormal peristalsis, regular cap, deep incusura in greater curvature of media, opposite an area on lesser curvature which seemed board-like and which peristalsis skipped. One fourth of the meal was still in the stomach in six hours. Saturated with belladonna for two days and reexamined with same findings.

Diagnosis: Carcinoma or ulcer of lesser curvature of media, and gall stones. Operation advised but definitely refused.

The patient was put on ulcer management and remained symptom free for four years. Then he had a recurrence of the symptoms and returned for examination. Our findings were practically the same except that a definite niche was seen on the lesser curvature opposite the incisura at the point where the boardy wall was noted at first examination.

In reporting to his physician he was again recommended for operation and as symptoms did not subside under management he submitted. On opening the abdomen an inoperable carcinoma of the lesser curvature with glandular involvement and a gall bladder full of stones was found.

Comment: By all the rules of the game this man should have had a carcinoma at the time of first examination but evidently it was still an ulcer at that time but four years later became malignant.

Case II. Male, aged 68. Weight loss thirty-five pounds in two years. Two and one-half years ago he started to have attacks of gassy, crampy, hungry distress in epigastrium coming on one hour after eating and at night. Distress was constant since onset with no variation. He was worse the first year, before he found he could get complete relief in five minutes by taking food or soda with relief lasting one to two hours. Pain would awaken him three or four times during the night after midnight and he would take a drink of soda water with great relief.

For the last one and a half years his bowels have been loose and watery. No vomiting or tarry stools. No palpable abdominal tumor. Urine, considerable albumin and a few casts. Blood: Hb. 65, R. B. C. 3,920,000, W. B. C. 11,000. Differential count negative. Stomach analysis: one hour return, total acids 60, free HCl. 20, combined acidity 40. Large amount of delayed food remnants. Strong occult blood test. Stomach analysis (fractional): no acidities up to one and one fourth hours at which time total acidity was 60, free HCl 20, combined acidity 40. In two hours had total acidity 72, free HCl 28, combined acidity 44. Occult blood constant, no lactic acid.

Roentgen ray: Very large atonic stomach with vigorous peristalsis and freely mobile. A small crater or filling defect on lesser curvature near pyloric ring and very definite tenderness. Almost complete obstruction as no appreciable amount of meal passed through in six hours. Reexamination after belladonna up to physiological effect produced no change.

Diagnosis: Ulcer or carcinoma of lesser curvature near pyloric ring with high grade pyloric obstruction.

Gastro-enterostomy with resection later if considered necessary, was advised.

Surgical findings: Ulcer or carcinoma of the lesser curvature of the pars pylorica.

Pathological findings: Ulcer with malignant base.

Comment: In this case it was impossible for either the diagnostician or surgeon on exploration to state whether the condition was malignant or non-malignant.

Case III. Female, aged 43. Four years before, ulcer near pylorus resected.

History: For ten years, attacks of growling, nauseating distress localized at navel, lasting three to four weeks with remissions about the same. Bad taste in mouth like medicine. Vomits frequently in attacks but never any blood. No tarry stools. Diarrhea constantly for several years and a great deal of gas in bowels. Normal weight 130, now 120. Four years ago had an ulcer near pylorica of stomach resected but did not get much relief. Distress has always been irregular in relation to food.

Examination: Urine and blood negative. Stomach analysis: total acidity 26, free HCl 8, combined acids 18; food remnants present; occult blood test negative.

Roentgen ray examination: Normal tone and size but tied down and deformed in pylorica probably from operation. Rest No. 2 in six hours. Reexamination after belladonna, no change.

On account of operative history we did not feel like suggesting further surgery at this time and she was given dietary advise.

Patient came back for examination one year later. Weight and symptoms were about the same but the roentgen ray showed a change in the pyloric condition and a greater degree of immobility, more deformity and a suspicion of a mass in this location. Exploration was advised but refused at this time.

Six months later she submitted to exploration and a carcinomatous mass the size of an egg was found at the site of the old scar on the stomach, with involvement of the glands of the lesser curvature.

Comment: This woman developed a carcinoma at the site of an ulcer resected 5 years before. With a misleading history and a stomach deformed from the first operation it was difficult to make a diagnosis.

Case IV. Male, aged 54, laborer. Gradual weight loss of fifteen pounds in three years.

History: Attacks of stomach trouble had occurred for three years. For the first two years, attacks of severe doubling, gassy, epigastric pain appeared about once every two months, coming on at 4 p. m. and lasting eight hours. They always came on a Sunday or holiday, that is, on a day when he was not working. For the last year, attacks have been daily, described as a grabbing epigastric pain relieved by belching and by vomiting a half cupful of sour bitter, yellowish fluid two hours after eating. Never any food returned. Very constipated and stools of fragmentary, burned type. He was a heavy user of snuff which aggravated distress as did also acids.

General physical examination: Several abscessed teeth. Tender point in upper right abdomen. Cachectic color, very suspicious of a severe blood disturbance or malignancy. Urine, negative. Wassermann negative. Blood: Hb. 65, R. B. C. 3,860,000, R. B. C. 10,100, differential normal. Stools negative. Gastric analysis: total acidity 44, free HCl 36, combined acidity 8; much mucus, no occult blood. Roentgen examination of stomach negative.

One could not make a definite diagnosis but on account of his cachexia and history a notation was made "possible malignancy". He was put on a careful diet and alkalies, and kept under observation for two months. He immediately became symptom free, his color returned to normal and he was lost track of for over three years. Three years later he returned stating that he had been perfectly well up to a few months ago when he met with a crushing inury to the chest. His stomach symptoms returned at this time and he was unable to control them with diet and alkalies.

His appearance was about the same as three years before, being very cachetic. His weight and subcutaneous fat were normal. Blood Hb. 55, R. B. C. 3,360,000. Gastric analysis: total acidity 66, free HCl 44, combined acidity 22. Roentgen ray examination showed a small pyloric lesion and delayed motility. On account of these findings and the fact that his symptoms could not be controlled by management we advised exploration which was refused. We did not feel at this time that we were dealing with a carcinoma but did feel that the case was surgical rather than medical. On his refusal of exploration we declined to assume further responsibility in his case and did not see him again for three months at which time he came in and from the change in appearance of the pyloric lesion and constant strong reaction for occult blood in the stools, we considered his condition malignant and again urged exploration which he flatly refused.

At this time his weight was above what it had been three years before. No diminution in subcutaneous fat and his acids were high. He was explored four months later and an inoperable carcinoma of the pyloris found.

Comment: This man went through an almost identical cycle nearly four years before, recovered and remained apparently well for three years. On his first examination we were suspicious of malignancy but could get no corroborative evidence. He evidently did not have a malignancy at that time but developed it three years later.

These four cases demonstrate how difficult it is in certain cases to make a positive diagnosis

and while the larger number of patients can be given a definite answer we are constantly being confronted with these problems.

One point I have failed to bring out and that we have found to be of considerable value, is the stool examination for occult blood. Its constant presence on meat free diet, with head, face and lower bowel foci excluded, usually means an open lesion in the upper tract. This constant presence demands of us a continued search until a satisfactory explanation is reached.

I am firmly of the opinion that there is no possibility at present of making an early diagnosis of cancer of the stomach. They are nearly always far advanced before they give symptoms sufficient to warrant seeking medical advice. Fortunate indeed is the individual with a carcinoma of the stomach who gets an early pyloric obstruction by reason of the growth chosing the pylorus as its site.

In summing up I would say that in a large majority of stomach cases, by the time the symptoms appear the different elements that go to make a diagnosis are, in order of their relative value,

Roentgen Ray,
History,
Physical examination,
Gastric analysis,
Stool analysis,
Other laboratory findings, (blood, etc.).

REFERRED PAIN IN HEART DISEASE*

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To one who is dealing largely with the cardiopath the symptom of pain is a not uncommon sign, occurring in a variety of cardiac conditions, not necessarily associated with diseases of the aorta or coronary arteries.

Since the time when Sir John Hunter gave his memorable description of his own agony in angina pectoris, so much has been written on this subject that the profession generally has come to regard pains in this locality as characteristic of aortic or coronary disease.

But if, in a given case, it seems reasonably probable that there is no aortic or coronary disease, then, pains in the left chest, top of shoulder, arm or hand are considered of minor import and variously diagnosed as intercostal neuralgia, muscular rheumatism, or neuritis.

Apparently, the part that valvular and myocardial disease may play in the production of pains quite similar to those of angina pectoris has not been sufficiently appreciated.

The text books spend considerable time describing the character of pain and paths of radiation in angina pectoris, but give scant mention to pain in heart disease.

Recently, however, S. Calvin Smith reports that precordial distress or pain was present in 77 per cent of young men rejected from the draft for myocardial change.

Sir Clifford Allbutt believes that the pain in angina pectoris is due to a stretching of the aorta, in the presence of aortitis; that the inflammatory process in the aorta must penetrate to the outer coverings before the aorta is capable of painful stretching; and, furthermore, that syphilis, rheumatic fever, and influenza, are the chief toxic agents causing inflammation in the aorta.

If, then, stretching of the aorta in aortitis can produce the pain of angina pectoris, is it not reasonable to suppose that stretching of the myocardium can produce pain in myocarditis? In the latter case the stretching may take the form of an over-strain or overload of the heart. But in both cases, infection, apparently, is the predisposing factor, otherwise the normal tonicity of the normal tissues would not permit stretching.

In valvular disease and myocarditis the heart muscle is not normal. *During and after every acute infectious process the heart muscle likewise is not normal.* It may return to normal if the infection has been mild or of short duration or scars may be permanently left in the myocardium by the replacement of muscle fibres with fibrous tissue.

We may readily surmise then, that every infection we survive is capable of taking something out of our myocardiums, manifested by a reduction of cardiac reserve force (which normally is very large) until the time comes

*Presented before the Minnesota State Medical Association, Duluth, Minn., August, 1921.

when this reserve force is so reduced that overstrain or overloading of the heart is easily accomplished.

One of the frequent signs of cardiac overstrain is pain. This pain is not in the heart, for the heart itself is insensative to pain, but is a referred pain located in the skin or muscle of the left chest, shoulder, arm and hand.

How this pain is produced and why it is referred to regions so remote from the heart is a problem that will need a little excursion into the early biological development of the vertebrae organism and the embryological alterations in the relative positions of the various body parts.

MECHANISM OF PREDUCTION OF REFERRED PAIN

There are two nervous systems in the body, the sympathetic and the cerebrospinal, serving different purposes and yet intimately connected.

Of the cerebrospinal we know most because by reason of its functions of sensation and motion it is open to investigation.

Of the sympathetic we are learning more, but there is yet much to know. Some of the facts that have been acquired are in the nature of surmises, because the exact nerve connection between the sympathetic and cerebrospinal systems is difficult of proof.

In the early development of the animal organism, the sympathetic nervous system appeared after the primitive digestive tube, the rudimentary circulatory system and the respiratory systems had been formed, in order to coordinate the function of these viscera. As the organism became more highly specialized, it shed its hard, insensitive outer covering, grew arms and legs and the softer outer body wall was rendered sensitive.

Thus we have the development of the sensori-muscular system subserving sensation and motion. Later the faculty of perception of pain and the location of the painful stimuli on the body surface developed and the cerebrospinal nervous system was thus complete.

It is evident then that pain was originally a protective reflex, and it is probable that the protective character still persists.

If a painful stimuli arose on the external body covering, the whole organism could remove itself from the offending neighborhood or if only an extremity were involved this alone could be withdrawn and thus only a few muscles need be involved in the act of protection.

Thus far we have been dealing only with the mechanism of protection of the organism from danger from without. How about danger from within the organism itself, such as disease or mal-function of any of its viscera?

As has been shown, the sympathetic nervous system was formed to coordinate the functions of the viscera, and the cerebrospinal system to furnish protection from without through its sensori-motor system. Now, by connecting these two systems, the muscles of the external body wall can contract on receipt of stimuli from the viscera and protect the viscera.

In health there is a constant stream of *afferent* impulses coming from the viscera along the sympathetic fibres to the central nervous system. These *afferent* impulses serve to coordinate all the functions of the body, maintain proper muscle tonus, proper blood supply, etc., and in health we are totally unconscious of these impulses.

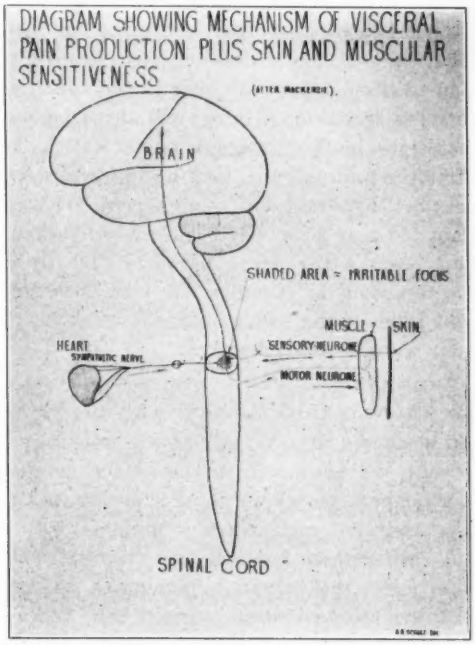


Figure 1

But in disease, when an organ is inflamed or stretched, or its shape or position is altered,

then excessive stimuli flow along the *afferent* nerves to the spinal cord and we become conscious of disagreeable sensations, varying with the degree of stimuli from mild pain to intense agony. As long as the condition of the organ remains altered, so long will excessive stimuli be received in the spinal cord. After a time, from repeated excessive stimulation, these spinal centers become hyperirritable and may irritate the contiguous nerve centers, stimulating them to their respective functions.

Since it is presumptive, from clinical experience, that the sympathetic centers lie in close proximity to the sensory and motor centers in the spinal cord it is easy to see how these sensory and motor centers are stimulated. And, since a sensory or motor nerve can only respond by its specific function when stimulated anywhere along its course, so when these sensory or motor centers in the spinal cord are irritated by the hyperirritability of the surrounding *afferent* sympathetic centers, these sensory and motor centers respond with sensation or motion respectively and refer the impulses to their peripheral distribution in the external body covering, resulting in superficial pain or tenderness or muscular contraction in these areas. As long as the spinal centers are irritable, so long will there be manifestations in the external body wall. Even after the pain is gone, skin and muscular soreness or "hyperalgesia" may persist for weeks. Pain too may be revived more readily than at first because the nerve paths are plastic and the threshold of stimulus has been lowered so that lesser stimuli may suffice to produce pain than were at first required.

Since the sympathetic nerves supplying the viscera, issue from the cord with the cerebrospinal nerves supplying the body wall over the viscera, we have only to know the origin of the sympathetic nerve to any organ to know what sensory and motor symptoms will develop when these segments are stimulated. But whereas in the primitive vertebrate, the cerebrospinal nerves were segmentally arranged around the body and the respective nerves supplied the skin over the viscera, in the higher vertebrate (i. e., man) with the development of arms and legs, segments of nerves were used to supply these extremities and the cutaneous nerve supply is no longer simple and orderly.

Also, in the development of the heart, in the early fetal life the auricles lie below the ventricles, only later coming to their final position above the heart. Undoubtedly the auricular nerve supply is determined by the primitive position and that accounts for the fact that there nerves come from segments below those going to the ventricles.

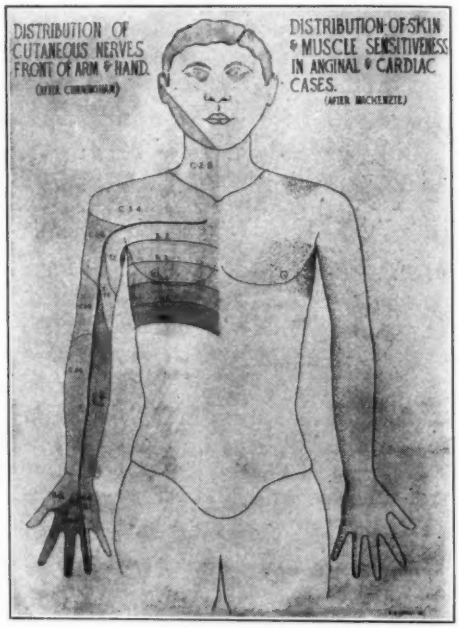

DISTRIBUTION OF CUTANEOUS NERVES FRONT OF ARM & HAND.
(AFTER CUNNINGHAM)
DISTRIBUTION OF SKIN & MUSCLE SENSITIVENESS IN ANGINAL & CARDIAC CASES.
(AFTER MACKENZIE)

Figure 2

According to Head, who has done more than anyone else to explain this intricate problem, the sympathetic nerves to the *auricles* come from the fifth, sixth, seventh and eighth thoracic segments whose cerebrospinal segments are distributed to the lower axilla and lower thorax front and back. The *ventricles* are innervated by the sympathetic fibres from the second to fifth thoracic segments, their cerebrospinal segments being distributed to the chest from the level of the second to seventh ribs and inner (ulnar) side of upper arm, forearm and hand.

The *ascending aorta* receives its sympathetic innervation from the third and fourth cervical segments with perhaps some involvement of

the first, second or third thoracic cerebrospinal segments, which are distributed in the first case to the base of the neck and top of the shoulder and in the latter case lower on the thorax and down the inside of the arm.

The *transverse arch* receives its sympathetic nerve supply from the fourth cervical, whose cerebrospinal segments go to the laryngeal areas of the neck.

The *descending aorta* receives sympathetic fibres from the second to twelfth thoracic segments, chiefly from the fourth thoracic downwards, whose cerebrospinal segments are distributed to the chest and upper part of abdomen.

Finally the *pulmonary artery* receives its sympathetic fibres from the fifth to the eighth cervical segments, whose cerebrospinal distribution is to the outer part of the arm, forearm and hand.

These borders are only approximate and undoubtedly overlap; also the nerve supply to each portion may overlap, but the figures and areas are sufficiently accurate for us to go by clinically.

It is easy to understand then, that a painful area in the chest wall, in the region of the nipple, may be a reflex from the ventricle and may indicate a cardiac overstrain rather than an intercostal neuralgia.

Reflex pain is common in myocarditis, in myocardial insufficiency and the beginning myocardial degenerations of early middle life. It is uncommon in mitral regurgitation, not infrequent in mitral stenosis but is most frequent in aortic regurgitation of all of the valvular lesions, perhaps because of the often associated stretching of the aorta, as well as to the load on the ventricle itself.

In young people pain is usually associated with acute infections such as rheumatic fever or influenza, or with chronic sepsis such as some focus of infection on the body, very frequently recurrent tonsillitis. It is particularly associated with the acute overstrains, where supreme exertion in the presence of infection, brings it on; it may likwise occur without infection where the myocardium is diseased or degenerated.

Why it is rarely present in chronic dilatations such as occur in chronic mitral insufficiency, is explainable on the grounds of muscle tonicity and stretching, mentioned earlier, in explaining the pain in angina pectoris as caused by stretching of the inflamed aorta. As long as the muscle is tonic and resists stretching, pain will result, or if the stretching is applied suddenly, pain will result, but when the stretching is applied slowly, or the tonicity is low, the muscle yields gradually and pain may not appear.

It is difficult to differentiate entirely the pain of angina pectoris from the pain of cardiac overstrain, but the main points of difference are, that the pain in angina is more apt to come in sudden, arresting attacks, to be brought on by exertion or excitement and to have, as a rule, its seat in the upper sternum from which it radiates to arm and hand and perhaps to leave the chest or arm sore for a few days after the attack. The pain in myocardial disease is more of a dull depressing continuous ache, and is located in the precordium (that is in the region of the apex of the heart) rather than under the sternum. Though it may occur in acute spasmodic attacks with pains down the arm, it is much more likely to persist and may last for weeks or months. In addition, in myocardial overstrain usually skin and muscular tenderness or hyperalgesia is present as long as the overstrain exists.

TO RECAPITULATE

1. Pain is a frequent finding in heart disease independent of angina pectoris.

2. Pain is a warning signal of an improperly functionating organ and in this sense is a protective reflex.

3. Pain is not felt in the heart but is a referred pain, through the *afferent* sympathetic fibres from the heart to the spinal cord and out along the contiguous sensory and motor spinal nerves.

4. The distribution of the contiguous sensory and motor segments is to the body wall of neck, should, chest, arm and hand.

5. Constant *afferent* stimuli to the spinal cord may cause an area of hyperirritability in the cord constantly stimulating sensory and motor segments. There result areas of pain and tenderness in skin and body wall which

are frequently diagnosed as intercostal neuralgia, muscular rheumatism or neuritis. These pains are protests from "an overworked, engorged, inflamed, underfed or decaying heart." heart."

6. Pain similar to angina pectoris may arise from the heart rather than the aorta; consequently all pains in these areas demand investigation of the cardiac function.

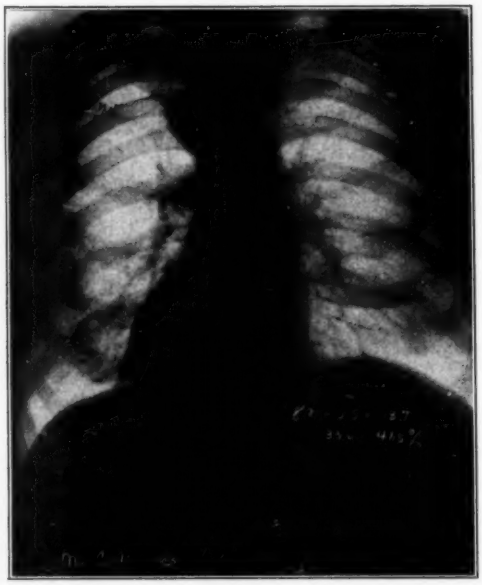
7. If the result of the cardiac examination is doubtful, treatment of a laboring heart will often bring relief.

In conclusion I wish to express my obligation to the works of Sir James Mackenzie, Sir Clifford Allbutt, Sir William Osler, Dr. A. D. Hirschfelder, Dr. Thomas Lewis, Dr. Charles L. Greene and Dr. S. Calvin Smith, which I have consulted freely.

These lantern slides show different types of hearts in which referred pains occurred.

Case I. Mr. N., age 65, clerk in store (formerly horse trainer) came in 1920 complaining of pains in both arms and in left breast, plus dyspnea and edena. Three years ago he had to give up life work of horse training because of pains in left breast and arm and has had pains more or less since.

Examination: Indefinite apical first tone, basal tones weak; no murmurs; rythm regular. B. P. 136/80. Wassermann negative. X-ray heart M.R.5.5., M.L.8.2. diameter 13.7cm. (41% of chest diameter). Marked arteriosclerotic kink to aortic arch.

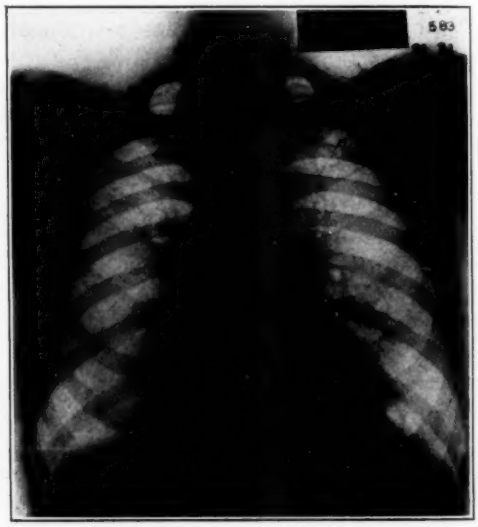


Case I

Under cardiac treatment, dyspnea and edema disappeared as well as right arm pain. Left arm and left breast pain still persists although to a less degree. Recently had pain in the muscles of the left side of the neck and external ear; under more rest and digitalis the pain in the neck and ear disappeared. Undoubtedly this pain in the neck and ear is an evidence of extension of cord irritability upwards as well as to the contiguous centers on the same level.

Case II. Mr. L., age 57, brick-layer, came in January 1921, complaining of pain in the breast on exertion—no pain if sits still.

Onset: Summer 1920 had to climb seven flights of stairs daily to go to work. Noticed that he would get pains in breast radiating to left shoulder, arm and fingers. No work since September 1920. Pain now under sternum, brought on by excitement, hurry, lifting, climbing stairs, etc. Slow recovery from "flu" two years ago, otherwise well.

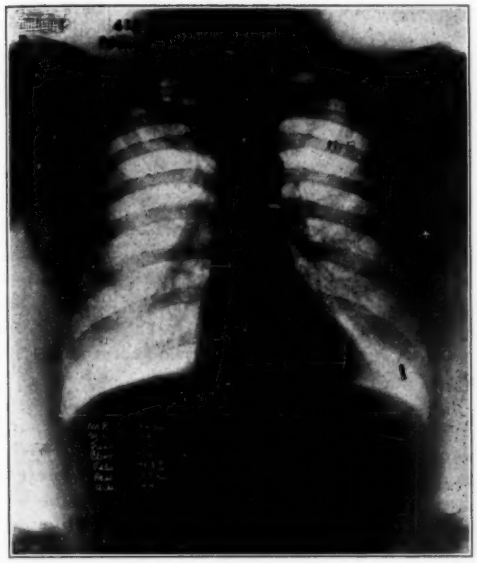


Case II

Examination: Heart slightly enlarged to left; rate moderate; rythm regular; a blurred apical first tone; systolic and diastolic murmurs at the base; no edema; Wassermann four plus positive; B. P. 164/64. X-ray heart M.R.5.3., M.L.9.5., diameter 14.8cm. (47% of chest diameter); no dilatation of the aorta.

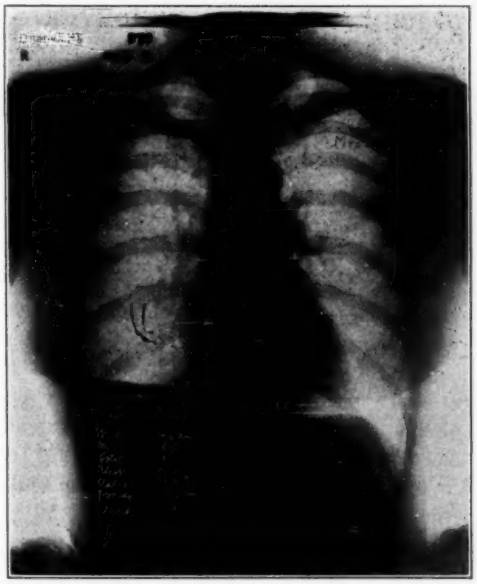
This man made great improvement while in hospital under cardiac and specific treatment, walking four blocks on his discharge without pain.

Case III. Mr. B., age 63, retired farmer, complaining of pain under tip of breast bone with exertion, for thirty years. During the past two years several attacks wth extreme exertion, which put him to bed. Now pains come in pit of stomach "grip like a fist" so he must stop and rest; between times comfortable; pneumonia 25 years ago; no alcohol; no tobacco.



Case III

Examination: Heart of small outline; soft systolic murmur at apex; basal tones indefinite; occasional extra-systole; B.P. 154/0. The following day a faint diastolic murmur was heard at second and third left interspaces (due to stretching of aortic ring.) This stretching accounts for the pain on exertion; sclerosis of arteries; Wassermann not made. X-ray heart M.R. 3.9., M.L. 8.6., diameter 12.5cm. Chest diameter 27.6cm.; heart ratio 45.3%.



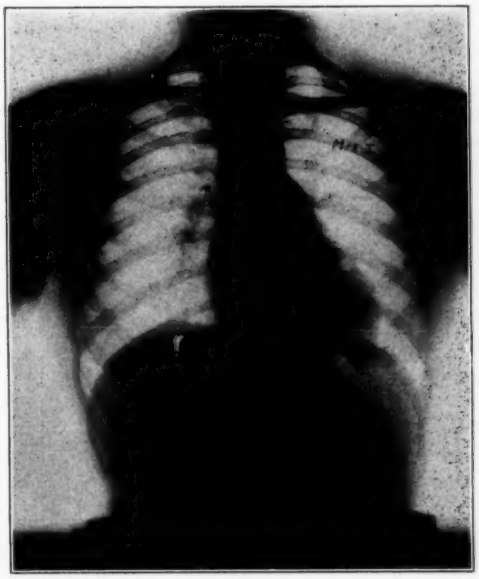
Case IV

Case IV. Mrs. E. S. D., age 55, complaining of pains in chest and back for six months, lack of endurance; left intercostal neuralgia for years; tenderness in region sixth dorsal vertebra; conscious of heart fluttering; twinges of pain in precordium.

Examination: Harsh apical systolic murmur transmitted towards axilla; rate 96; rythm regular; blood pressure 180/80.

Under rest and digitalis, tenderness in region of sixth vertebra disappeared, also intercostal neuralgia; blood pressure 145/80 after five days, finally down to 120/80. X-ray M.R. 4.6., M.L. 8.5., diameter 13.1cm.; chest diameter 25.2cm.; heart ratio 52.0%.

This case is a typical example of the substandard individual the so called "congenital asthmetic" whose myocardium is of poor tonus and easily strainable on exertion, producing referred pains.



Case V

Case V. Mrs. E. J., age 33, complaining of pains in left shoulder; fatigue; lack of endurance; had a "cold" recently since when above symptoms; four years ago acute toxic myocardial insufficiency; tonsillectomy; and well until now.

Examination: Heart enlarged to left with an indefinite apical first tone and a splitting of the second tone at the third left interspace which becomes a diastolic murmur on exertion; rate 72; rythm regular; tenderness in left breast and arm; blood pressure 140/80. X-ray M.R.3.2., M.L.10.2., diameter 13.4cm.; chest diameter 26cm.; heart ratio 51%.

Pain gradually disappeared under cardiac treatment. The appearance of the basal diastolic (aortic) murmur on exertion is an index of the strainability of this heart and seems to account for the referred pains.

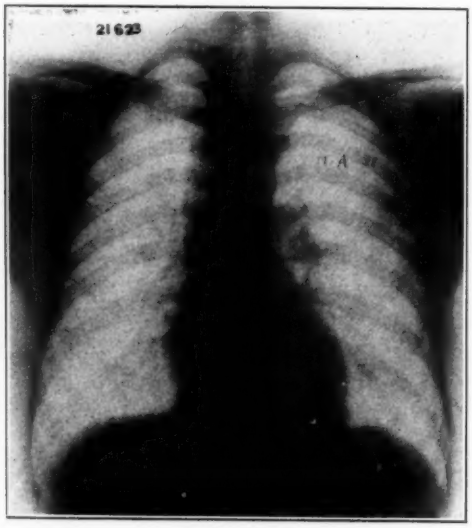
Case VI. Mr. Bernard A., age 22, grocers clerk, complaining of fatigue; weakness in left arm; pain in left chest muscles. An acute overstrain in four years ago while shoveling coal; got lighter work and fairly well till now; tonsillitis frequently; "Flu" three years ago—quite sick—never quite got strength back although O. K. unless overworked.

Examination: Systolic murmur at apex; diastolic ta base; capillary pulse in lips; rate 80; rythm regular; blood pressure 140/70; Wassermann negative.

Bed and tonsillectomy. Pains gone; diastolic murmur louder at base.

X-ray heart M.R.5.7., M.L.8.0., diameter 13.7; chest diameter 29.7cm.; heart ratio 46%.

This case shows the effect of strain in the presence of infection as a causative factor in producing referred pains. Note the widening of the aorta.



Case VI

DISCUSSION

DR. E. L. TUOHY, Duluth: Dr. Hensel deserves a great deal of credit for following up the original teaching or writing of MacKenzie, and placing for us on paper some of the criteria by which we may more clearly differentiate chest pains. That diseases in the heart may give rise to pain is, of course, self evident. As I looked at Dr. Hensel's slides I was interested in noting that there was in most of the cases associated organic disease of the heart. My own findings from a fairly large experience has been just that: associated with pain that we might assume to be of cardiac origin there was other evidence of cardiac disease. Insofar as we depart from that statement we run into the usual danger that is likely to follow where pain is interpreted as an isolated phenomenon,—whether pain in the head is indicative of tumor, or pain in the right lower quadrant is coming from the appendix. We must accept Dr. Hensel's statement that anyone coming with an acute illness or infection may show evidences in the entire heart musculature of weakness or strain. But in addition to pain we should look for other cardiac evidences, such as dyspnea and signs such as you get with the stethoscope.

In judging pain in any part of the body we must consider another feature brought out by him, namely the individual threshold to pain. On individual may have pain and another with similar and far advanced disease, will have no pain. An individual with carcinoma involving the pancreas, with metastases in the liver, may have no pain whatever and some one else with nothing but a gastric neurosis may have much pain.

I think Dr. Hensel is to be congratulated for having brought out these facts regarding pain, showing its distribution, and the only word of warning I wish to sound is that we should be guarded against interpreting this pain as an isolated phenomena, for the literature on almost any subject shows the danger that may result from such procedure, whether it be a pain coming from the pelvic organs, a headache that is supposed to be always due to the sinuses, or a cardiac pain that we think is always due to the focal infection, and for which so many people are losing their tonsils and teeth. We must remember that our information must dovetail, that it must not be forced, and that we must give due credit to the conviction that pain can arise from the heart that is under strain, and, as has been shown, particularly when the aorta is involved.

REPORT OF AN EPIDEMIC OF PARATYPHOID FEVER AMONG UNIVERSITY STUDENTS*

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Epidemics of paratyphoid fever have been considered uncommon enough to give great interest to the observation of the disease and its report. However, paratyphoid fever was not uncommon in the allied armies during the World War. Martin and Upjohn[1] report 5,700 cases of enteric fever at Gallipoli of which 93 per cent were paratyphoid and only 7 per cent typhoid. In a study by Hunt[2] of four water borne epidemics in Pennsylvania, in 1911, out of a total number of 509 cases 117 presented atypical features and of these about 50 per cent were typhoid. Miller[3] thinks that a care-

*Presented before the Minnesota State Medical Association, Duluth, Minn., August 1921.

ful investigation of other epidemics would show relative frequency of paratyphoid.

In this epidemic occurring in a community in which typhoid fever is rare, in a selected group of individuals of approximately the same age and a majority of the same sex, added interest accrues to the features and characteristics of the disease.

The material for this report has been obtained from the records of 52 cases among students of the University of Minnesota who were hospitalized by the Students' Health Service. In addition to these, nearly as great a number were treated elsewhere in the city and state, making a total of approximately 106 cases. Of the 52 cases here reported 48 were men and 4 were women. This discrepancy, as will be mentioned later, is due to the fact that very few women students ate at the place where the infection occurred. The age varied from 16 to 42 and averaged about 22 years.

Some clinical features were of very marked interest. The onset of illness, in most cases from March 14 to March 19, 1921, usually quite abrupt, was marked with headache, backache, malaise, and anorrhexia; rigor was occasionally observed.

Severe headache was very common. In but half of the cases were symptoms referable to the gastro-intestinal tract present; these were chiefly diarrhea, nausea, and vomiting, occasionally associated with abdominal tenderness and cramps. A very few cases were observed with symptoms of acute upper respiratory infection. Epistaxis was present in a few cases. Joint and back pains were prominent. Fewer cases presented more gradual onset without much diarrhea and were less severe in their course. The early occurrence of herpes about the lips in the disease was an interesting and frequent feature. Examination of the chest during the first week was negative except in four cases where the signs of a diffuse bronchitis were present. The heart showed an increased area of dullness in three cases and in nine a systolic murmur was heard at sometime in the course of the disease. A dicrotic pulse was noticed in a small percentage of the cases. The abdomen, in a few cases, presented signs that were difficult of interpretation. Abdominal tenderness, with distention, was noticed in 8 cases. In 3 this was maximum in the right lower quadrant and was associated with rigidity. One case especially, in the second week of the disease, showed signs of a local peritonitis in the region of the appendix. Operative procedures were not deemed advisable and recovery was uneventful. One other case treated elsewhere was operated for acute appendicitis; death occurred later.

The skin lesions were of exceedingly great interest. They appeared on approximately the ninth day of the disease in a considerable number of the cases and were observed in 42 out of the 52 patients. Their distribution in several instances involved the abdomen, chest, extremities and neck. While the rose spots were few in number in some of the minor cases, most of the severe ones had unusually numerous spots, many of them as large as a pea. The profusion and relatively huge size of the rose spots made a striking clinical picture. In a few cases successive crops were observed.

The spleen was palpable in 25, or approximately half of the cases, during the second week of the disease. The enlargement was moderate in most of the cases, and the spleen was most frequently palpable just below the costal margin.

The examination of the blood was interesting in that 10 out of 28 cases, during the first 8 to 10 days of the disease, showed a leucocyte count of 10,000 or above, reaching 14,000 in one case. In all of these, in which the count was later repeated, there was a reduction to below 10,000 cells. The finding of a slight leucocytosis is contrary to usual observations. Uhlenroth and Hubener[4] state that there may be a leucopenia in paratyphoid fever. Tyron[5], however, reports an epidemic of paratyphoid dysentery in which the white blood cells varied between 3,000 and 13,000 per cubic millimeter. The cases with complications, including local peritonitis, otitis media, and spondylitis, showed a leucocytosis, which aided in diagnosis. The urine in a majority of cases showed a trace of albumin and occasionally casts. No actual severe nephritis was seen. The diazo reaction was positive in only two out of 18 cases. The atropin test was tried in 5 cases. Following the use of

1/30 grain of atropin sulphate the effect upon the pulse rate was the same as in normal individuals.

The Widal reaction with bacillus typhosus (dilution 1-50) in 5 cases taken 3 to 5 days after the onset of the illness and 9 days after the presumptive date of infection was negative. In these same five cases the reaction was positive 4 days later. Cultures of bacillus paratyphosis B were used for agglutinative tests first after isolation of the organism from the discharges at the end of the second week of the disease. After that date agglutination occurred with bacillus paratyphosus B in 38 cases, in which higher titration was used, in dilutions of from 1 to 1,000 to 1 to 20,000. Agglutination of bacillus paratyphosus A did not occur in any case.*

A majority of cases, about 88 per cent, showed the presence of agglutinins for bacillus typhosus, some in dilutions as high as 1 to 1,000. This is in keeping with the common observation of the development by one member of the typhoid-paratyphoid group of agglutinins for other members.

Two of the cases with a negative Widal reaction followed by a positive had been vaccinated in 1918. Krumweide[6] mentions that the application and interpretation of the results of the Widal reaction following vaccination become exceedingly difficult. Of 52 cases 20 had been vaccinated with typhoid-paratyphoid cultures in the usual manner, one in 1920, three in 1919, and the others in 1918. Three of the 20 cases had received only one of three injections. In the clinical course of the disease no marked variation was noted in the vaccinated group as compared with the unvaccinated. Bacillus paratyphosus B was isolated from the stools in 15 cases. Repeated examinations frequently gave negative results. Examination of stools during the first week give the greatest number of positive results according to many observers.

After the first few days the clinical picture of drowsiness and apathy formed a contrast with that of anxiety and restlessness found in acute respiratory infections. In most cases diarrhea abated as the disease progressed. The fever commonly present arose rapidly, was of irregular intermittent type and often showed a daily variation of 2 to 3 degrees, sometimes associated with rigor and profuse sweating. Hyperpyrexia was not observed and in the most severe cases the temperature seldom went above 105°. The average duration of fever was 20 days. Defervescence usually occurred more rapidly than in typhoid fever. Mild and abortive types of the disease were observed of only a few days duration in which agglutinative tests aided in their diagnosis.

Complications were infrequent. However, one case during the second week of the disease developed intestinal hemorrhage which was persistent, did not yield to treatment including the transfusion of citrated blood and caused death. Autopsy revealed typical deep and coalescing ulcerations in the cecum and colon, fewer in the lower ileum, with changes in the mesenteric glands and spleen characteristic of typhoid fever. Extensive ulceration was present at the base of the appendix. In this connection it is interesting to note that in 16 fatal cases of paratyphoid fever Dawson and Whittington[7] found at autopsy three cases with the appendix ulcerated and responsible for a peritonitis and conclude that the large intestine and appendix are more frequently involved than in typhoid. This is in keeping with the clinical observation of at least 4 cases in this series with evidence of appendicitis. Small amounts of blood were observed in stools in 3 or 4 cases. Otitis media prolonged the course in two cases and in one the development of a typhoid spondylitis was a cause of great distress to the patient. Altogether, complications were fewer and the course of the disease shorter than found in many epidemics of typhoid fever.

The early recognition of the disease, occurring in a city with a very low typhoid incidence, was difficult. At the first an enteritis from meat poisoning as occurs with absorbtion of toxins from the bacillus enteritidis and other organisms as mentioned by Krumweide[6] was suggested, possibly of short duration. With, however, continued fever over some days and with quite marked prostration, typhoid fever was strongly suggested. In a few cases the

*The agglutinative tests and final bacterialogy were done under the direction of Miss A. M. Wade of the laboratory of the State Board of Health.

signs suggested an acute respiratory infection. Wiltshire[9] in a study of an epidemic of 98 cases in England caused by bacillus paratyphosus B, calls attention to the clinical resemblance to influenza and thinks that paratyphoid fever fills the gap in the clinical picture between typhoid fever and influenza. Blood cultures during the first eight days. In 5 cases were negative. Stool specimens were taken but reports were not available before the appearance of rose spots. Widal reactions which were absent in 5 cases during the first 8 days of the disease developed by the 10th day. Diagnosis was therefore not established until the appearance of the rose spots. The leucocyte count of 10,000 and above in several of the cases obviously gave no information of great differential value in diagnosis. The actual isolation of the bacillus paratyphosus B in the stools revealed the true character of the infection as one of paratyphoid fever. Bacillus paratyphosus B was found in 15 cases. One positive blood culture was obtained on about the seventh day of disease in a case that developed later in the epidemic. Clinically, the features were those of typhoid fever, especially during the first ten to twelve days. The shorter incubation period, the frequent abrupt onset, the shorter course of the disease, the fewer complications and the lower mortality rate coincide with the characteristics of paratyphoid fever.

Mode of Infection: It was promptly established by the Staff of the Division of Preventable Diseases of the State Board of Health in collaboration with Dr. John Sundwall, that the infected individuals, almost without exception, ate some of their meals at the Minnesota Union, that a majority had dinner there Sunday, March 13th, in several instances only at that time, and that milk was an article of diet commonly used. The milk used on this day was in bulk form. Of interest was the instance of a family of four in which following one Sunday dinner at the Minnesota Union the two children who had alone used bulk milk developed the disease while the parents were free from infection.

Investigation of all employees at the Minnesota Union revealed four carriers of bacillus paratyphosus B. Three were not ill. One had slight symptoms but kept on duty. It is not known nor probable that these individuals were carriers previous to the epidemic. Of great interest was the discovery in one student, who later presented himself for inoculation, of a positive culture of bacilli paratyphosus B from the stool, with no history then or at any other time of illness. In other words, an individual himself immune was a carrier of possibly virulent paratyphoid bacilli. It seems probable that infection occurred through handling of bulk milk by a carrier. Krumweide[10] found 4 per cent of healthy carriers in a regiment of 786 soldiers infected with bacillus paratyphosus A.

CONCLUSIONS

1. In an epidemic of approximately 106 cases of paratyphoid fever among students, the clinical features were those of typhoid fever with variation in the occurrence of herpes about the lips in several cases, with unusually numerous and large rose spots, with comparatively sudden onset, with frequent profuse sweating, intermittent fever and often quite rapid lysis of fever. Complications were present in about 4 per cent of the cases and the mortality rate was about 2 per cent.

2. Infection probably occurred through the contamination of bulk milk by carriers.

3. Vaccination from 1 to 3 years previously did not confer immunity in the twenty individuals who had been previously inoculated with triple vaccine, or appreciably alter the course of the disease.

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DISCUSSION

DR. S. MARX WHITE, Minneapolis: This epi-

demic was of very great interest for a number of reasons. I had an opportunity to see a number of the cases in the Students' Health Service, and observed the students who were ill at the University Hospital. The mode of onset was of very great interest, possibly because of the character of the infection and because we had an opportunity to study a large number of cases and be impressed with the premonitory symptoms. The symptoms of the paratyphoid fever came on about the tenth day with the appearance of rose spots. The intestinal symptoms were very interesting and like those I had an opportunity of observing in 1904 at the Farm School. An infection got into the water supply at that time and there were sometimes gall-bladder and gall-duct symptoms occurring which did not occur in this epidemic, but the intestinal symptoms were much the same. In that epidemic while 160 students were involved, only two developed typhoid fever. It seemed that there was some typhoid infection at that time but the number who succumbed to it was small. At this last epidemic it is probable that the infection was in the milk, and for that reason the very great number succumbed to the infection.

Concerning the clinical features, Dr. McKinlay brought out some points which I would like to emphasize, The occurrence of herpes is rare in typhoid, but does occur. In typhoid fever the individual who shows herpetic symptoms will usually be shown to have herpes frequently from colds, and sometimes without any other evidence of nose or throat infection. The skin lesions in these cases were particularly striking. They were not the rose spots we ordinarily see in typhoid, the small pale lesions. They were much larger, they were raised, and the distribution was particularly striking for they showed lesions over the extremities. That is not peculiar to paratyphoid for we sometimes see it in typhoid, but in this epidemic they would frequently be present over the arms and wrists, and sometimes over the backs of the hands, these large, raised roseolae.

I wish also to emphasize the importance of the early leukocytosis. It is not unusual in typhoid. I have myself seen it in typhoid; in one instance a leukocytosis of 23,000 was found which rapidly subsided and after that showed leukopenia.

In conclusion, I think this epidemic illustrates very well the results of modern epidemiological work. As I understand it, practically all the cases were primary infection and through the application of epidemiological principles the disease was limited to that group.

DR. J. A. MYERS, Minneapolis: In the beginning of this epidemic the patients were being sent into the hospital in good sized numbers and it occurred to me to be a good opportunity to determine the effect of an acute disease other than pneumonia on the lung capacity. Peabody and Wentworth (1917) suggested that the low lung capacity observed during pneumonia convalescence may be present after any severe acute infection. It was interesting to find that only a small percentage of the paratyphoid cases had lung capacities reduced to below normal limits. All complications, such as pleurisy, cardiac lesions and pneumonia caused a marked reduction in the lung capacity. Therefore, this test was found valuable in the early detection of such complications.

DYSTOCIA DUE TO OVARIAN TUMORS*

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Minneapolis, Minn.

An ovarian tumor complicating pregnancy is not so rare as was formerly supposed, due, no doubt, to more careful ante-partum examination. That they actually prevent conception must be admitted because of the frequency of ovarian tumors in the non-pregnant and their relative infrequency in the pregnant. On the other hand, they also increase the possibility of abortion. Remy in a series of 321 cases and Jetter in a series of 215 cases found that abortion occurred in 17 per cent of their cases.

The frequency of the association of pregnancy and ovarian tumors varies considerably as shown by various statistics. In 17,832 births in the Berlin Frauenklinik, an ovarian tumor was found only five times. This percentage is, no doubt, low as Shauta reports 12 pregnancies in a series of 1132 ovarian tumors, Wiener 11 pregnancies in 240 ovarian tumors while Norris states that ovarian tumors occur once in every 3000 pregnancies.

Much has been written upon the occurrence and management of ovarian tumors in pregnancy, labor and the puerperium. In this paper, I wish merely to consider their occurrence and management in labor and report a rather unusual case.

If the tumor is small and high up in the pelvis or abdomen, it may cause no trouble, but if it be low down, large and incarcerated in the pelvis or intraligamentous, it becomes a serious complication. Torsion of the pedicle of an ovarian tumor with its resulting necrosis and gangrene occurs two to three times more frequently in the pregnant than in the non-pregnant state. Its frequency in labor is

*Presented before the Clinical Club of Minneapolis, May 20, 1921 and the Fairview Hospital Staff, June 24, 1921.

given by various authorities at from 15 to 34 per cent. It is seen more often in the solid type of ovarian tumors such as dermoids and fibroids. Rupture of an ovarian tumor occurs in 13 to 25 per cent of the cases and is usually found in the large cystic type especially when under pressure as is seen during natural labor or operative delivery. The contents may be discharged into the abdominal cavity causing no untoward symptoms or resulting in severe shock, pain and vomiting, even peritonitis and death. If the circulation of the tumor is interfered with from pressure or torsion, suppuration may take place followed by rupture with chills, fever, peritonitis and death. In some cases of the cystic type, a hemorrhage may take place into the cyst resulting in its rapid enlargement with symptomes of internal hemorrhage. If this hemorrhage has existed for some time and the contents have become thick, tarry and sticky, they are readily infected by lying against infected tissue such as the rectum and may also suppurate and rupture, resulting in peritonitis and death. Some of the larger more solid types of ovarian tumors not properly managed during labor may result in rupture of the uterus or, if low in the pelvis, may be forced ahead of the child and rupture into the vagina or rectum and thus out of the body; spontaneous ovariectomy.

The diagnosis of an ovarian tumor during labor is frequently difficult. If it is out of the pelvis it may be hidden from examination, lying entirely under the spleen or liver. The lumbar regions should always be carefully palpated as it can very often be located here. It must not be confused with a hydronephrosis. If free in the abdominal cavity it can be palpated as a spherical mass and must be differentiated from a uterine fibroid, double horned uterus or a twin. If it is low down and incarcerated in the pelvis, its nature can usually be determined by a rectal examination when it must not be mistaken for a hematoma or a prolapsed kidney. During a pain it may become so tense as to be mistaken for a fibroid. It is very important that it be differentiated from a fibroid because fibroids usually cause much less trouble during labor and recede after delivery. This frequently cannot be done before operation. In cases of doubt, the examination should be made with the patient under anesthesia. In this connection, it may be well to remember that an ovarian cyst may simulate a pregnancy as in the case cited by Cragin of a girl with amenorrhea, enlarged abdomen, fluid in the breasts and darkened areolae which was diagnosed by examination under ether anesthesia and verified at operation. On the other hand pregnancy may be overlooked in the presence of a tumor when the abdomen is opened. The uterus has been opened by mistake or accidentally and when this happens, it should be emptied and the wound closed as in Caesarian section.

The prognosis does not depend so much on the size of the ovarian tumor as it does upon its location, its nature, the promptness with which it is recognized, and the skill of the one in charge. The mortality from this complication has decreased markedly as is seen when some of the earlier statistics are compared with the more recent reports. This is due to earlier diagnosis and more skillful management, resorting more frequently to laparotomy rather than vaginal puncture or incision and the expectant form of treatment formerly practiced. McKerron's statistics show a maternal mortality of 30.5 per cent and a fetal mortality over 50 per cent. In Heiberg's series of 271 cases with delivery by forceps without puncture of the cyst, the maternal death rate was 50 per cent; with puncture, almost as great; and after version without puncture more than 50 per cent. Patton, in 1906, in a series of 95 cases treated expectantly the maternal mortality was 26.3 per cent; in 31 cases treated by tapping, the mortality was 38.7 per cent; in 184 cases treated by overiectomy the mortality was 4.3 per cent. In more recent statistics as those of Herbert Spencer, we find no maternal mortality and a fetal mortality of 32 to 33 per cent depending on the method of treatment.

TREATMENT

When the patient is seen in labor with an ovarian tumor which apparently is not obstructing labor, it may be well to leave it alone although the second stage of labor may be hastened using mechanical dilation, Vorhies bags, hysterotomy or forceps. Version should never be done. If the cervix is closed and

very firm, vaginal caesarian section may be indicated. Spencer recommends ovariectomy at the end of the first stage followed by forceps delivery by the assistant. After delivery, if ovariectomy has not already been done, it should be done in 24 to 48 hours to prevent any infection which may follow injury to the tumor. To do a laparotomy and remove the tumor mass closing the abdomen to allow labor to progress naturally is not the best procedure because of undue strain on the recent scar. There are cases on record, however, that have been managed in this way with no bad results.

On the other hand when we find the tumor is actually obstructing labor, we have a much more serious condition. If the patient is seen early in labor, attempts should be made to push the obstructing mass up out of the pelvis. This can best be accomplished during deep anesthesia with the patient in the Trendelenburg, exaggerated Sims, or knee-chest position. This, however, is a very dangerous procedure and so has been abandoned by many obstetricians. Great care must be used because of danger of injury to or rupture of the tumor. It can also be tried in cases seen late in labor when still more care must be exercised in the attempt. If the labor is dry, the lower uterine segment is very thin. It should never be attempted in dermoids, or infected or adherent tumors. If the tumor can be replaced, the patient can be allowed to continue in labor and be delivered naturally or if there is a complete dilatation of the cervix, forceps may be applied. It is also well to remember that the tumor may again fall into the pelvis and interfere with the delivery of the placenta. After delivery, the tumor should be removed as early as possible by laparotomy.

If the tumor is adherent or incarcerated in the pelvis, laparotomy should always be done. The best procedure and the one advocated by most obstetricians is to do Caesarian section followed by ovariectomy. This is certainly the course to pursue if the cervix is not dilated. Some authorities recommend waiting for complete dilatation of the cervix, but this is not without some danger. If the cervix is completely dilated and laparotomy is done, attempt should be made to raise the tumor from the pelvis by pushing the uterus aside. If this is successful the child can be delivered by forceps by an assistant through the natural passages and finally ovariectomy be performed. If the tumor mass cannot be raised out of the pelvis or is infected, Caesarian section should be done and the mass removed afterward. If both ovaries are involved and it is impossible to save ovarian tissue, a Porro operation had better be performed. Also, in the presence of infection, a supravaginal hysterectomy should be done at the same time draining the pelvis or attaching the stump extraperitoneally as recommended by Norris. The abdomen is, perhaps, best opened through a median incision. In removing the mass great care should be used in tieing the ovarian vessels. Silk ligatures seem to be the best as there is less danger of their slipping or being absorbed too early. If the head of the child becomes firmly wedged between the tumor and the side of the pelvis, craniotomy is the best procedure.

Vaginal section may be done in some selected cases where the tumor is small and free. It is more difficult to palpate the other ovary by this route and in operating, the pedicle may slip away before tieing. It is rarely done, being supplanted by the abdominal route.

Some good results have been reported by puncturing the cystic mass through the vagina or incising the tumor and packing till the child is delivered when the tumor is removed in 24 hours. There is danger of injury to large blood vessels and the uterus as well as infection and adhesions. The relief at best is only temporary. This is rarely done at the present time and its only indication seems to be when the patient is at a distance from competent help and something must be done at once.

If the patient is allowed to continue in labor and the obstruction not recognized, we may have the tumor forced ahead of the child, finally rupturing either into the rectum as happened in my case or through the vagina. If the birth of the child does not follow the rupture of the tumor into the vagina, the tumor should be removed and the child delivered by forceps. On the other hand, if the rupture has taken place into the rectum, there is less danger of infection if the child is delivered by forceps and the tumor dealt with afterwards,

even though the forceps delivery may add to the trauma of the maternal tissues.

I wish to report a case which can under my observation at the Minneapolis General Hospital. I have not been able to find in the literature at my disposal a similar case reported.

Mrs. E. O. Swedish woman, aged 37, married, white. Family history—negative.

Personal history—Married four years, one child 2½ year ago—instrumental delivery—child died on the third day. Mother was in the hospital two weeks because "she couldn't walk and felt a bearing down pain all the time." She doesn't believe she had any fever and at the end of a month felt perfectly well. Has had no miscarriages.

Menstrual history—Menses have always been irregular coming on as often as every two weeks until the birth of her child, since which time they have been more normal. Menstruation started at 13 years, has been irregular, painful, as often as two times a month, lasting four or five days, considerable in amount and containing small clots.

Past history—She has never been sick aside from slight sore throats. She menstruated last time on May 27, 1916. She had some slight nausea and vomiting during the early months of pregnancy, otherwise felt perfectly well. She doesn't remember when she felt life for the first time. Bowels, bladder and breasts gave her no trouble. She had a slight headache before her entrance. The Dispensary records show she made a visit there on Feb. 7, 1917, at which time, nothing abnormal was noted.

History of Present Illness—She was taken sick on Feb. 21, 1917 at 8 A. M., while in bed when she noticed water coming away from her. On arising, she felt pains come on at once which gradually increased and she came to the hospital, entering at 10:15 A. M. on Feb. 21, 1917. Labor progressed normally, the pains gradually increasing in frequency and severity. I did not see the patient until 4:30 P. M. when called by the interne. Examination of the patient was negative except for the pregnancy and labor. The blood pressure and urine examination was normal. The pelvic measurements were 25-27-31-19. Abdominal palpation showed a fetus LOA position with the fetal heart 140, of good quality, heard to the left and below the navel. Pains were strong and regular coming every 3 minutes. The interne informed me he made a rectal examination but could not feel the head, thinking it was either a breech or edematous cervix. Abdominal examination showed the buttocks in the epigastrium with the back to the left and front and the head toward the pelvis floating high and not at all engaged. During the pains, the vulva showed slight gaping as did the anus. After surgical preparation, a vaginal examination was made, the head was found very high with the cervix low, the posterior lip lying on the posterior vaginal wall. During the pain, a firm mass seemed to press up from the rectal side which caught the finger in the vagina rather firmly. At the same time, I noticed the anus gap and a dark bluish mass presenting at the anal opening. Rectal examination was then made and a softened elastic mass could be felt, which could be pushed back into the rectum for some distance but not enough to get a feel of the head. This mass again came down with the next pain and looked very much like a hematoma. It was then discovered that the rectal mucous membrane was torn for some distance and we were dealing with a neoplasm, probably ovarian. After some thought, with the patient in very active labor and the damage already done, the child was delivered by forceps at 5:37 P. M. with only a slight mucous tear. The recto-vaginal septum was very thin and only consisted of the vaginal mucous membrane. The placenta was delivered in 15 minutes with the aid of Crede. Close examination was now made of the rectum showing the tear about six inches long on the anterior rectal wall leaving only vaginal mucous membrane to separate the rectum and the vagina. The bluish tumor mass could be seen retracting upward and situated outside of the rectum in the space between the rectum and the vagina. The vaginal mucous membrane was slit upward giving more room to deal with the tumor. The cystic tumor mass was pulled down and its pedicle ligated carefully and the cyst removed. The pedicle was allowed to retract after irrigating the cavity with a weak solution of lysol. The peritoneal opening was closed by a high purse-string suture. The rectal mucous membrane was next closed and the perineal body built up, finally approximating the vaginal mucous membrane, reinforcing the chronic cat gut stitches with four silk worm gut stitches and placing a cigarrette drain deep to the peritoneal opening through the perineum. The patient was given strychnine and ergot by hypo. Her condition was good on leaving the table.

Examination of the tumor shows a bluish soft elastic multilocular mass about the size of two fists. It consisted of numerous cysts varying in size, some filled with a clear straw colored fluid, others with a semi-gelatinous material.

Microscopic examinations showed a multilocular cystadenoma of the ovary.

Subsequent history: The patient had to be catheritized for one day following the delivery. She had involuntary bowel movement following castor oil on the third and fourth day, after which she was able to control them. The drainage was removed on the third day. She developed some burning urination on the tenth day which cleared up in two days. On the eleventh day the stitches were removed and the patent also developed some soreness of the right nipple. This was followed next day by tenderness of the breast but no fever and practically cleared up on the sixteenth day. On the eighteenth day she was taken with chills and fever with headache and a sore throat. The temperature was 100.6 and

pulse 98. The throat was painted with silver nitrate after taking a culture and a gargle was given. The culture was negative and the throat gradually improved. On the twenty-fourth day the throat seemed to get worse as did the right breast which seemed painful and tender, temperature rising to 104 and pulse 120. The throat gradually became worse, markedly swollen and a peritonsillar abscess was found which was opened on the twenty-ninth day with the escape of a large amount of pus. The breast was treated with binders and an ice cap but in spite of this it gradually grew worse so it was opened on the forty-first day after delivery with escape of a large amount of pus, a culture of which proved to be a pure staphylococcus. The temperature and pulse both dropped after opening the breast and lancing the peritonsillar abscess. The rest of the convalesence was normal. There was primary union of the perineal tear and the patient was able to control the bowels after the fourth day. The patient was discharged on the sixty-eighth day after delivery. The baby showed no ill effects from the mother's stormy convalesence.

The patient was again seen one month after leaving the hospital and examination at that time showed her in excellent health. She said she could not feel better. Examination of the perineum showed it very well healed and competent. She had no trouble at all with the bowels.

In conclusion, I would say

1. Diagnosis of the presence, nature and location of an ovarian tumor during labor is of the utmost importance.

2. The treatment of this complication should be dealt with more from an obstetrical standpoint rather than a surgical one.

3. If the tumor does not obstruct the passage of the child, labor may be allowed to terminate normally but the tumor should be removed as soon after delivery as possible.

4. If the tumor obstructs the birth of the child, careful attempts should be made to repose the tumor and allow the labor to terminate normally.

5. If reposition is impossible, laparotomy should be done.

6. When laparotomy is done, attempts should be made to bring the tumor out of the pelvis. If this is possible it can be removed and the child delivered through the natural passages. If not, Caesarian section shall always be done followed by ovariectomy. In the presence of infection, hysterectomy had better be done.

7. Vaginal puncture and vaginal incision of the tumor should be done only when skilled help is not obtainable and the obstruction must be relieved. When done it should be followed by laparotomy as soon as possible.

8. Vaginal celiotomy for removal of a tumor frequently entails many difficulties and may better be replaced by the abdominal route. It should only be done when the tumor has a long pedicle, is small and not adherent.

9. Vaginal Caesarian section should be restricted to cases in which the cervix is firm and undilatable and the tumor free in the abdomen.

10. Forceful delivery by forceps or version in the presence of an obstructing tumor should rarely if ever be done.

11. An impacted head complicated by an ovarian tumor should be dealt with by craniotomy.

I wish finally to express my thanks to Dr. F. L. Adair, on whose service the patient was admitted, for his kind permission to report this case.

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EDITORIAL

PRESIDENTIAL SELECTION

For many years there has obtained in the Minnesota State Medical Association, so far at least as we are able to ascertain, an unwritten law which provides that the Presidency of the Association shall be had one year by a resident of Minneapolis, the next year by a resident of St. Paul, and the third year by a resident of the state at large. Why this particular and peculiar method of rotation was established, or why it should continue, or whence it originated, we have not been able to determine, and we have been more or less familiar with the proceedings of the Society for the last twenty-five or thirty years.

We are of the opinion that the rule should be abrogated for the reason that it is neither just nor equable. It may be possible that during the earlier years of its existence the Society found it difficult to select men of large attainments outside the cities; but most assuredly such is not now the case, for in almost every city of any size there are men whose qualifications are quite equal to any of those resident in the two larger cities.

It will be found on looking over the scientific programs of the meetings for several years past that most of the papers contributed come from men in the cities, but it will also be noted by those who have attended the scientific sessions or have read the published articles that papers contributed by the so-called "country members" have as much merit and contain as much valuable material as do those of their brethren in the larger centers of population.

We believe that a large proportion of our country members have a well defined idea that the Association is run primarily for and by the profession of the Twin Cities, and this assertion is made only after a careful consideration of replies to questions directed to them on this particular point.

We are of the opinion that the time has now come when we should depart from this time honored and, we might also say, obsolete custom, and elect our presiding officer from the state at large, not giving any consideration whatsoever to any particular city or location.

J. T. CHRISTISON,
For the Editing and Publishing Committee.

MINNESOTA AND THE REFERENDUM ON ALCOHOL

The results of this appeal to the profession in Minnesota were published in the Journal of the A. M. A., the issue of Jan. 14, 1922. It is notable that many of the leading newspapers of the State immediately came forth with news and editorial notice.

The present method of suggesting ultimate prohibition has not put the medical profession in an enviable light; it is doubtful whether the excellently intentioned plan of the A. M. A. is going to improve our position.

We know among ourselves that taking a vote on any mooted scientific point would be a shamelessly unscientific method of deciphering the truth. No matter how the doctors may vote on this question of whisky as a medicine, most critics will wish to know how we stood on the question of whisky as a beverage. It is notorious that doctors commonly urge their patients to strenuously avoid food that is distasteful or has proven disastrous to themselves—this often quite independent of the caloric possibilities of the food interdicted.

Then, doctors have never been noted for a

proclivity to unanimity. Witness the jumble we get into when we get into court, testifying as so called "experts," with skilled attorneys to bring out and direct our testimony. The referendum, of course, seeks to get the medical judgment purely on the question of the need of alcohol as a drug. It is beside the point to remind us that it is not our business to make comment on the principles of prohibition or the degree of its success. This must be apparent, because up to date the recognized medical profession is the only agency through which alcohol in beverage form, for sick or well, can **legitimately** be secured. The best of our profession sorely resents this state of affairs, because anyone can see how directly this unites up the unprincipled among us with the agencies in the field seeking to supply those suffering souls, who see in every shift of the wind a possible attack of "flu," or in every rustle of the grass a rattlesnake ready to strike.

In this inquiry only twelve Duluth physicians admitted having federal permits to prescribe liquor. Beer and wine, in neither city nor rural practice in Minnesota appear to have many strong adherents. This is what might be expected in a state of, "such magnificent distances," where bulk counts, and where the profession has not been given over much to the reading of foreign medical literature.

As far as whisky is concerned, it is to be noted that conservative St. Paul voted forty-two in favor of whiskey and forty-one against it. This is supposedly from the medicinal point of view, but those who know best the medical history of our State see in these comparative figures nothing unusual.

Minnesota as a whole voted definitely against alcohol as a necessary stimulant. Nevertheless, many conscientious physicians feel that it has a place. The science of Physic is not so impoverished but that we might well dispense with a good many fairly useful medicines. This has been repeatedly done; for what we cannot accomplish in one manner we can usually devise other agencies. Many drugs with far less obnoxious secondary effects than alcohol have been thrown in the discard, and we are professionally none the losers thereby, but mankind is not interested in our pharmacological dissertations on alcohol as a medicine, but is amazingly wedded to the cup that inebriates, even though it cheers.

All through the letters that have come to the A. M. A. pertaining to this situation is the urgent suggestion that the Government should itself dispense such liquor for which there appears to be an actual need. If this were done it would remove much of the opprobrium that naturally now falls on our profession. We are being made the butt of endless jokes in vaudeville and out by our prescription writing brethren. If whisky is any good at all it ought to be at least pure. Those who learned well how to make it, and preferred to age it an indefinite number of years, evidently did so not for pastime but for good and sufficient reasons. Those who drank properly made whisky which had been given a chance to age and lose some of its toxicity, were able to work the next day. Most of the old school, genteel drinkers, have accepted prohibition; the younger aspirants for fame seem willing to drink anything in a bottle. The Government could at least issue pure alcohol or whiskey.

A new generation that had not been fed up on the idea of alcohol and its beverage variations may some time control public opinion. In that time the medical uses of alcohol will present no greater difficulties than those of digitalis or caffeine, and incidentally, let it be noted that there is no limitation now imposed on the number of prescriptions any doctor may write for these recognizedly useful drugs.

E. L. T.

INFLUENZA IN 1922

The prevalence of influenza reported from various eastern points during the past month is most alarming. We are accustomed to expect more or less of a grippal seizure during the early months of each year, but reports go to show that this year the number of cases constitute a very decided and severe epidemic.

Various localities in England have been visited by epidemics of influenza since last November, which have lasted some six to seven weeks. London was hard hit in mid-December, and in early February there was no indication of a decline in the number of deaths reported.

It is noticeable that infancy and old age are most heavily attacked, in marked contrast to the epidemic of 1918, when youth bore the brunt of the attack. It is reported that the complication of pneumonia is not so serious during the present epidemic, and it would be interesting to know what the cause of the present high mortality is.

Eastern points in the United States have been severely attacked by the return or recrudescence of the influenza epidemic. We are informed that the high mortality at present in New York is due to pneumonia, not however, a complication of influenza. The influenza itself is reported as not being so severe nor so prone to the complication of pneumonia as in the epidemic of three years ago.

It is fair to suppose that the present epidemic will reach Minnesota, sooner or later, and it behooves the profession to be as prepared as possible for this pest for which in honesty we must admit we have no specific remedy, and, in fact, the cause of which we do not know. In spite of the extensive study of the epidemic of 1915 (or shall we say 1918-1922) the bacteriology of the disease is obscure. We are justified, however, in advocating prophylactic inoculations of the mixed vaccine (so-called influenza vaccine) in the hope of lessening the likelihood of complications, notably pneumonia. The importance of the use of fresh vaccine cannot be overemphasized. Quarantine, though inefficient, should be carried out. The strange tendency of epidemics to recur periodically (some have noted a periodicity of thirty-three weeks in influenza) has not been explained by the epidemiologists. It would seem that a certain active immunity in influenza does take place, a fact emphasized by the report that the age incidence in the present epidemic is decidedly different from that of the epidemic in 1918.

OBITUARY

Alfred J. Murdock, M. D., 3161 Columbus Ave., Minneapolis; born 1847, graduated from Columbia University in 1869; died January 4, 1922.

Christian Johnson, M. D., Everett, Washington. Practicing physician in Minnesota for thirty-six years, formerly residing at Willmar. Born July 17, 1853; graduated from the Washington University Medical School in Baltimore in 1875. Died January 3, 1922.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

AMERICAN CONGRESS OF INTERNAL MEDICINE

Rochester and Minneapolis, April 3 to 8, 1922.

The annual meeting of the American Congress of Internal Medicine, which is the medical organization corresponding to the American College of Surgeons, will convene the first three days beginning April 3rd in Rochester, and the last two days, Friday and Saturday, in Minneapolis. Many distinguished visitors from all over the United States are expected to attend this meeting, and on Friday it is scheduled a convocation to which all guests will be welcome.

MINNEAPOLIS CLINIC WEEK

April 10 to 13, inclusive

The Hennepin County Medical Society will hold its fifth annual Clinic Week this year April 10 to 13, inclusive. This immediately follows the meeting of the American Congress of Internal Medicine, the last two days of which will be held in Minneapolis, on Friday and Saturday. This will enable visitors to include both of these important meetings in the same visit to Minneapolis. The headquarters of Clinic Week will be at the Hotel Radisson, and a number of distinguished members of the profession have been invited to address the meetings. The program will appear later.

The third regular meeting of the Minnesota Branch of the Society for Experimental Biology and Medicine was held at the University of Minnesota on Wednesday evening, February 8, 1922. The scientific session was preceded by the usual dinner in Room 208, Men's Union at 6:30 p. m. The scientific session was held in Room 129, Millard Hall, at 8:00 p. m.

The following papers were read:

1. R. A. Gortener and W. F. Hoffman (by invitation), "Evidences of a Gel Structure in Gelatin Gels."
2. F. H. Scott and C. C. Gault (by invitation), "The Regulation of Respiration."
3. A. T. Henrici and G. S. Reynolds (by invita-

tion), "Potassium Iodide Does not Inhibit Experimental Actinomycosis."

4. Leonard Larson (by invitation), and W. P. Larson, "Factors Which Control the Fat Content of Bacteria."

PRELIMINARY PROGRAM PUBLIC HEALTH INSTITUTE, UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN., MARCH 20 to 25, 1922

Offered by Medical School, University of Minnesota, State Board of Health and United States Public Health Service.

Lectures—Clinics—Demonstrations—Conferences.

COURSE I.

"VENEREAL DISEASES," Dr. H. G. Irvine, director, Division of Venereal Diseases, Minnesota State Board of Health. For physicians, health officers and others engaged in treatment or control of venereal diseases.

SYPHILIS. Six lectures with day and evening clinics.

1. Early Syphilis, Symptoms and Diagnosis,
2. Visceral Syphilis, Symptoms and Diagnosis,
3. Neural Syphilis, Symptoms and Diagnosis,
4. Congenital Syphilis, Symptoms and Diagnosis,
5. Interpretation of Blood and Spinal Fluid Tests,
6. Treatment of Syphilis.

GONORRHOEA. Four lectures with day and evening clinics.

1. Acute Gonorrhoea in the Male, Symptoms and Diagnosis Treatment,
2. Chronic Gonorrhoea in the Male, Symptoms, Diagnosis, Treatment.
3. Acute Gonorrhoea in the Female, Symptoms, Diagnosis, Treatment,
4. Chronic Gonorrhoea in the Female, Symptoms, Diagnosis, Treatment.

PUBLIC HEALTH EDUDATION AND VENERAL DISEASE CONTROL—EIGHT LECTURES

1. "The Principles of Public Health Education," by Dr. Fred R. Green, secretary, Council on Health and Public Instruction, A. M. A.

2. "The Legal Limitations, Powers, and Duties of Health Officers," Dr. Fred R. Green.

3. "Health Education in Sex Hygiene."

4. "The Delinquent Girl and Venereal Diseases," Miss Jessie Binford, Interdepartmental Social Hygiene Board.

5. "The Courts in Relation to Venereal Diseases and Delinquents."

6. What Minnesota Has Done to Control Venereal Diseases," Dr. H. G. Irvine, director, Division of Venereal Diseases, Minnesota State Board of Health.

7. "Social Service in Relation to Venereal Diseases."

8. "Law Enforcement in Relation to Prostitution."

Note: Lectures 1 to 6 are common to both courses.

DR. FRED R. GREEN

A public lecture on the develoment of modern scientific medicine, illustrated with lantern slides and moving pictures, and entitled, "The Invisible World, a Health Travelogue."

Monday, March 20, 8 p. m., in East High School Auditorium.

COURSE II.

"MATERNAL AND INFANT HYGIENE," directed by Dr. E. P. Lyon, Dean Medical School, U. of M.

For physicians, health officers, public health nurses and others who now are or will be engaged in maternal and infant welfare work or its promotion. Eighteen lectures.

1. "What Has Been Done for Maternal and Infant Welfare in Minnesota," Dr. Wm. F. Wild, executive secretary, Minnesota Public Health Association.

2. "History of Maternal and Child Welfare Work," Dr. Fred W. Schultz, Minneapolis.

3. "Principles of Maternal Welfare," Dr. Fred L. Adair, associate professor of Obsterics and Gynecology, University of Minnesota.

4. "Common Disturbances of New-Born Infants," Dr. F. C. Rodda, associate professor of Pediatrics, University of Minnesota.

5. "The Rural Clinic Program," Dr. N. O. Pearce, associate professor of Pediatrics, University of Minnesota.

6. "The Principles of Child Hygiene," Dr. Walter R. Ramsey, associate professor of Pediatrics, University of Minnesota.

7. "The University Courses in Public Health Nursing," Miss Florence Jones, director Public Health Nursing, University of Minnesota.

8. "How to Raise a Community Fund," Mr. Otto Davis, executive secretary, Minneapolis Council of Social Agencies.

9. "Part of the A. R. C. Nurse and Chapter in the Infant Welfare Program," Miss I. C. Johansen, Field Supervisor, A. R. C.

10. "Results of Proper Maternal Care," Dr. Fred L Adair, associate professor of Obstetrics and Gynecology.

11. "The Artificial Feeding of Babies," Dr. E. J Huenekens, assistant professor of Pediatrics.

12. "The Organization and Administration of Infant Welfare Work," Miss Natalie Rudd, executive secretary, Infant Welfare Society of Minneapolis.

13. "Common Errors in the Care of Young Infants," Dr. Walter R. Ramsey, associate professor of Pediatrics, University of Minnesota.

14. "Woman's Responsibility in Putting the Sheppard-Towner Law Into Effect," Miss Marguerite M. Wells, president Minnesota League of Women Voters.

15. "Pre-Natal Field Work and Nursing Pro

cedures," Miss Helen C. Peck, supervisor Pre-Natal Field Work, Minneapolis Infant Welfare Society.

16. "Welfare of Children During Pre-School Age," Dr. E. J. Huenekens, assistant professor of Pediatrics.

17. "Practical Application of the Principles of Infant Welfare Work," Miss Natalie Rudd, executive secretary, Minneapolis Infant Welfare Society.

18. "The State Program for Maternal and Infant Hygiene," Dr. A. J. Chesley, executive officer Minnesota State Board of Health.

19. "Nursing Technic and Standards of the Visiting Nurse," Miss Alma Haupt, assistant superintendent of the Minneapolis Visiting Nurses Association.

20. "The Social Agencies of Minnesota in Relation to Infant Welfare Work," Mrs. Mildred Mudgett, supervisor of Field Work, Sociology Department of University of Minnesota.

Venereal Disease Clinics are exclusive for physicians and others actually engaged in the treatment of venereal diseases.

Infant and Pre-Natal Clinics will be given at-

ST. PAUL

Wilder Charities, 20 persons, Monday, Wednesday and Friday afternoons.

MINNEAPOLIS

Margaret Barry House, 4 persons, Monday and Friday afternoons.

Southtown Clinic, 4 persons, Monday and Friday afternoons.

Unity House, 4 persons, Tuesday and Friday forenoons.

Wells Memorial House, 4 persons, Tuesday and Friday afternoons.

Northeast Neighborhood House, 4 persons, Tuesday, Wednesday and Friday afternoons.

Pillsbury House, 20 persons, Wednesday afternoon.

Talmud Torah, 4 persons, Thursday afternoon.

Monday, Wednesday and Friday afternoons, those who are not attending clinics will be assigned to Group Conferences, Demonstrations, Visits to Hospitals, Milk Stations or Nutritional Clinics, so everyone will have opportunity to study every phase of practical work.

On Friday evening at 8 o'clock, the Parents' and Teachers' Association of St. Paul, presents a health program in the St. Paul Auditorium, to which all are invited.

Anyone who desires to attend the Institute should send notice at once stating the course in which he wishes to register.

Adjustment of program in case one desires to combine parts of the two courses, must be made in advance.

Registration begins promptly 8:30, Monday, March 20th.

Assignment to classes and clinics, etc., must be made at that time.

Attendance at Institute is absolutely free.

Please notify Dr. A. J. Chesley, director of the Institute, care of State Board of Health, State Capitol St. Paul, about attendance and courses.

The Park Region Medical Society held its annual meeting at Fergus Falls in January, at which the following officers were elected: President, Dr. A. C. Baker; Vice President, Dr. John Hoffman; Secretary-Treasurer, Dr. Theo. S. Paulson.

The Winona County Medical Society at its recent annual meeting elected the following officers for the ensuing year: President, Dr. Hans Lichenstein; Vice President, Dr. W. V. Lindsay; Secretary, Dr. C. P. Robbins; Treasurer, Dr. Irwin Steiner.

THE ST. LOUIS MEETING OF THE AMERICAN MEDICAL ASSOCIATION

May 22-26, 1922

The May meeting of the American Medical Association at St. Louis promises well toward being the largest in attendance of any of the Association's sessions. Since the publication of the hotels in the Journal of the Association in December, inquiries and reservations are being made daily. The hotels and the Convention Bureau are aiding the Committee in a most satisfactory and helpful way to see the Fellows are comfortably housed and accommodated. The A. M. A. meetings tax all cities entertaining them to the limit of hotel capacity. Whenever possible a good Fellow should double up so that no one is left without a comfortable lodging.

Reservations should be made by communicating direct with the hotels. If satisfactory arrangements cannot be made in this way, write to Doctor Louis H. Behrens, Chairman Committee on Hotels, 3525 Pine Street, St. Louis Mo.

A. M. A. MEETING

St. Louis, May 22-26, 1922

The Western Passenger Association has authorized a special rate on the certificate plan of a fare and a half for round-trip for all points to St. Louis and return at the time of the annual meeting of the A. M. A. Minnesota physicians may purchase tickets at the same rate via Chicago, allowing a stop-over of ten days in Chicago. The Chicago and Eastern Illinois calls attention to their service trains leaving Chicago at 10 A. M., 9:15 and 11:30 P. M., arriving respectively in St. Louis at 5:50 P. M., 7:05 and 7:30 A. M.

ST. LOUIS' LEADING HOTELS (ALL EUROPEAN PLAN), THEIR LOCATION AND RATES

Hotel, with Number of Rooms	Street Address	Without Bath		With Bath	
		Single	Double	Single	Double
American, 275	7th and Market Sts.	.....	.....	$2.50-3.00	$4.00-6.00
Diseases of Children					
American Annex, 225	6th and Market Sts.	.....	.....	2.00-3.00	3.00-6.00
Pathology and Physiology Pharmacology and Therapeutics					
Beers, 114	Grand and Olive Sts.	$1.50	$2.50	2.00-2.50	3.00-3.50
Brevort, 50	4th and Pine Sts.	.....	.....	2.00	3.00
Cabanne, 43	5545 Cabanne St.	.....	.....	12.00-37.50*	
Claridge, 350	18th and Locust Sts.	.....	.....	2.50-4.00	4.00-10.00
Obstetrics, Gynecology and Abdominal Surgery					
Hamilton, 160	Hamilton and Maple Sts.	.....	.....	2.00-2.50	3.50-4.00
Jefferson, 400	12th and Locusts Sts.	2.50-3.00	4.00	3.00-8.00	6.00-10.00
Surgery, General and Abdominal Orthopedic Surgery					
Laclede Hotel, 265	6th and Chestnut Sts.	1.50-2.00	2.50-3.00	2.50-3.00	3.50-4.00
Majestic, 200	11th and Pine Sts.	.....	.....	2.50-3.00	3.50-4.00
Dermatology and Syphilology Nervous and Mental Diseases					
Marion Roe, 200	Broadway and Pine Sts.	.....	.....	1.50-2.00	3.00-4.00
Marquette, 400	18th and Washington Sts.	2.00-2.50	3.00-3.50	3.00-3.50	4.00-6.00
Laryngology, Otology and Rhinology					
Maryland, 240	9th and Pine Sts.	2.00	3.00	2.00-3.50	3.00-5.00
Gastro-Enterology and Proctology Urology					
Planters, 400	4th and Pine Sts.	2.00-2.50	3.00-3.50	2.50-5.00	4.00-8.00
Ophthalmology					
Plaza, 200	3300 Olive St.	.....	.....	2.00-2.50	3.50-5.00
Roselle, 100	4137 Lindell Blvd.	.....	.....	1.50-2.50	2.50-3.50
St. Francis, 120	6th and Chestnut Sts.	1.50-2.00	2.50-3.00	3.00-4.00	4.00-5.00
Statler, 650	9th and Washington Sts.	.....	.....	3.00-7.00	5.50-9.50
Practice of Medicine					
Stratford, 100	8th and Pine Sts.	1.50-2.00	3.00	2.50	3.50
Terminal, 100	Union Station	1.50	2.50	3.00-3.50	5.00
Warwick, 200	15th and Locust Sts.	.....	.....	2.00-4.00	4.00-6.00
Stomatology Preventive Medicine and Public Health					
Westgate, 125	Kingshighway and Delmar Sts	2.00	2.50	3.00	3.50

*Weekly rates only.

The regular monthly meeting of the Hennepin County Medical Society was held in the library, Donaldson Bldg., Monday, Feb. 6, 1922, at 7:45 P. M.

PROGRAM

Monday Evening, Feb. 6th, 1922

1. "Lymanhurst," F. E. Harrington, M.D., LL.D., Commissioner of Public Health and Director of Hygiene.

2. "Cardiac Signs in Early Pulmonary Tuberculosis in Children," Thomas Ziskins, M.D., Consulting Cardiologist, Lymanhurst School for Tuberculous Children.

3. "Morphological Studies on the Blood of Tuberculous Children," Hal Downey, Ph.D., and A. R. Ringoen, Ph.D., Consulting Hematologists, Lymanhurst School for Tuberculous Children.

4. "Gastro-Intestinal Findings in a Group of Tuberculous Children," C. B. Wright, M. D., Consulting Gastro-enterologist, Lymanhurst School for Tuberculous Children.

5. "On the value of Vital Capacity of the Lungs of Children as an Aid in the Diagnosis of Pulmonary Tuberculosis," C. A. Stewart, M.D., Consulting Pediatrist, Lymanhurst School for Tuberculous Children.

6. "A Preliminary Report of the X-ray Findings in a Group of Tuberculous Children," R. G. Allison, M.D., and R. E. Morse, M.D., Consulting Roentgenologists, Lymanhurst School for Tuberculous Children.

7. "A Comparison of the Height-Weight Indices of Suspected Tuberculous and Normal School Children," R. E. Scammon, Ph. D., Consulting Anatomist, Lymanhurst School for Tuberculous Children.

8. "A Study of the Clinical and Physical Findings and the Tuberculin Reactions in a Group of Tuberculous Children," E. D. Anderson, M.D., Consulting Pediatrist, Lymanhurst School for Tuberculous Children.

9. "Orthopedics in Tuberculous Children," Paul W. Giessler, M. D., Consulting Orthopedist, Lymanhurst School for Tuberculous Children.

10. "Incidence of Infection of Mouth, Nose,

Throat, and Ear in Tuberculous Children," Carl W. Waldron, M.D., Consulting Stomatologist and Oto-Laryngologist, Lymanhurst School for Tuberculous Children.

11. "Observations on the Neurologic and Mental Status of a Group of Tuberculous Children," Charles E. Nixon, M. D., Consulting Neurologist, Lymanhurst School for Tuberculous Children.

12. "The Status of the Thyroid Gland and the Basal Metabolism in a Group of Tuberculous Children," C. A. McKinley, M.D., Consultant in Thyroid Disorders.

13. "Classification and Treatment of Suspected Tuberculous School Children in Minneapolis," J. A. Myers, M.D., Chief Consultant, Lymanhurst School for Tuberculous Children.

UPPER MISSISSIPPI MEDICAL SOCIETY

The annual meeting of the Upper Mississsippi Medical Society was held at Brainerd, Minn., Jan. 18, 1922. Officers were elected as follows:

President, Dr. C. G. Nordin, Brainerd, Minn.; First Vice President, Dr. M. E. Withrow, International Falls, Minn.; Second Vice President, Dr. E. E. Holman, Pine River, Minn.; Third Vice President, Dr. E. J. Pengelly, Ironton, Minn.; Secretary-Treasurer, Dr. G. I. Badeaux, Brainerd, Minn.

The delegates to the State Convention are: Dr. P. M. Hall, State Sanatorium, Minn.; Dr. G. I. Badeaux, Brainerd, Minn.

Alternates: Dr. L. M. Roberts, Little Falls, Minn.; Dr. A. E. Williams, Backus, Minn.

The following papers were read:

1. "Local Anaesthesia — Eye, Ear, Nose and Throat," Dr. C. G. Nordin, Brainerd, Minn.

Discussion: Dr. Garlock, Bemidji, Minn.; Dr. L. T. Davis, Wadena, Minn.; Dr. N. Nelson, Brainerd, Minn.

2. "Sciatica," Dr. B. I. Derauf, Brainerd, Minn.

Discussion: Dr. M. E. Withrow, International Falls, Minn.; Dr. F. L. Wilcox, Walker, Minn.; Dr. Jos. Nicholson, Brainerd, Minn.

3. "Fractured Pelvis" (Case History with Radiographs), Drs. Marcum and McAdory, Bemidji, Minn.

Discussion: Dr. Holst, Little Falls, Minn.; Dr. Beise, Brainerd, Minn.; Dr. Paul Kenyon, Wadena, Minn.

4. "Sanatorium Observations," Drs. Hall and Douglas, State Sanatorium, Minn.

Discussion: Dr. G. Mcl. Walde, Wadena, Minn.; Dr. C. J. Woolway, Deerwood, Minn.

Time and place of next meeting is to be decided by committee, but will probably be held sometime in May.

COMMUNICATIONS

The following letter from Dr. A. W. Daniels to his son has been submitted for publication. Dr. George F. Merritt, of St. Peter, died on October 26th, 1921. The communication throws light on the esteem in which Dr. Merritt was held by one of his many professional friends.

Pomona, Cal., Nov. 2, 1921.

"My dear son:—

"Your letter bringing the news of the death of Dr. Merritt came Monday, and it gave me a day of gloom that I could not throw off. Grateful I am that Providence so graciously cast my lot, in my life's work, by the side of a competitor of such eminent worth. Between us his half century in St. Peter was passed happily—without a break of that affectionate relationship that always existed. He rounded out a long and beneficient life, and won the honor of his Order and the profession that he lived to exalt.

"He was so fond of Bryant's Commentary on Death, that I have no doubt it had something to do with shaping his life. He often repeated it to me, when together in heart to heart conversations. It is as follows:

" 'So live, that when thy summons comes to join
The innumerable caravan which moves
To that mysterious realm where each shall take
His chamber in the silent halls of death,
Thou go not, like the quarry-slave at night,
Scourged to his dungeon, but, sustained and soothed
By an unfaltering trust, approach the grave
Like one who wraps the drapery of his couch
About him, and lies down to pleasant dreams.' "

"I recall with pleasure his love of Humanity, his devotion to his profession, and the devoted relationship that existed for so many years between us.

"Affectionately,

—A. W. Daniels."

OF GENERAL INTEREST

Dr. and Mrs. J. L. Lynch, of Winona, are spending the winter in California.

Dr. C. R. Sanborn, of Bemidji, is in the East where he is taking a special course in medicine.

Dr. F. R. Sanderson and Miss Margaret Madden, both of Rochester, were married on January 19th.

Dr. R. M. Eppard, of Duluth, has located in Cloquet, where he will engage in the practice of medicine.

Dr. M. M. Hursh, of Grand Rapids, is in Baltimore, where he is taking a three months course in surgery at the John Hopkins Institute.

Dr. H. M. McIntire, of Waseca, has returned from Chicago where he has been taking a post graduate course in the Institute of Surgery.

On December 25, 1921, Dr. C. A. Anderson, of Rush City, secretary of the Chicago-Pine County Medical Society, was accidentally killed by a train.

Dr. Adam M. Smith, of Minneapolis, announces the removal of his offices from the Physicians and Surgeons Building to 534 Syndicate Building.

Dr. Woods Hutchinson, of New York, addressed the staff of the Mayo Clinic January 18; he discussed, "Causes of high death rates reported."

Dr. A. W. Daniels, a former resident and pioneer physician of St. Peter, celebrated his ninety-third birthday recently at his home in Pomona, California.

Dr. S. G. Cobb, of St. Paul, celebrated on January 15th the twentieth anniversary of the opening of his private hospital at Iglehart and Cleveland Avenues.

Dr. H. F. Helmholz, Dr. R. M. Wilder, and Dr. C. Greene, of Rochester, were elected members of the American Physiological Society at the recent meeting in New Haven.

Dr. Thomas J. Kinsella (Minnesota 1919), and Dr. Edward A. Regnier (Minnesota 1921) have become members of the Nicollet Clinic, Minneapolis, in the division of surgery.

Dr. John H. Stokes of the Mayo Clinic, recently addressed Institutes in Memphis, Tennessee, and Louisville, Kentucky, as a special consultant of the United States Public Health Service.

Dr. C. O. Tanner, who was formerly a member of the Surgical Department of the Nicollet Clinic, Minneapolis, has moved to San Diego, California, where he will engage in the practice of medicine.

Dr. W. J. Kucera, of Hopkins, is spending some time in the East taking post graduate work in diseases of the eye, ear, throat and nose. Dr. F. J. Kucera, recently assistant in pharmacology at the University of Minnesota, is taking care of his brother's practice during the latter's absence.

Dr. A. S. Hoiland, of Argyle, has gone to New York City where he will spend a year at the New York Post Graduate Medical School and Hospital taking a special course in diseases of the eye, ear, nose and throat.

At a recent meeting of the Hennepin County Medical Society the following officers were elected: President, Dr. A. E. Benjamin; Second Vice President, Dr. J. S. Reynolds; Secretary and Treasurer, Dr. R. T. LaVake.

Dr. J. C. Bloodgood of Baltimore, Associate Professor of Clinical Surgery at the Johns Hopkins Medical School, gave a Mayo Foundation Lecture, January 14; he discussed, "The present day trend of surgery and pathology and the outlook for the future."

At a meeting of the Board of Directors of the Pokegama Tuberculosis Sanatorium, Pine City, January 24, 1922, it was decided to construct a fire proof building of forty-five room capacity consisting of private rooms and small wards, and also for the housing of the laboratory, x-ray equipment, drug room and offices.

LEGISLATION

Final Enactment of the Willis-Campbell Anti-Beer Law (H. R. 7294). Adoption of the Conference Report on this measure, forbidding the manufacture and sale of medicinal beer, by the Senate on November 18, 1921, by a vote of 56 to 22, and its signature by the President on November 23rd, 1921, brought its enactment into a law. Previous to signing the bill President Harding referred it for report to the Treasury Department, which had recently issued lengthy regulations for the distribution of beer on a physician's prescription. The Secretary of the Treasury promptly gave his endorsement to the proposed act. A summary of the provisions of the law as finally adopted in both houses of Congress follows:

(a) The bill prohibits the prescribing of beer or malt liquors for medicinal purposes.

(b) Not more than one-fourth gallons of vinous liquor, or vinous or spiritous liquor separately or in the aggregate containing more than one-half pint of alcohol may be prescribed in ten days.

(c) Physicians are limited to 100 prescriptions in ninety days unless extraordinary reason is presented.

(d) The commissioner may cancel or require

change of permits to manufacture patent medicines and preparations used as a beverage even if they are unfit for beverage use, or require the formula for making extracts to be changed, or may cancel the permit, if it appears to the commissioner that the sale or use of such articles is substantially increased by reason of their use for beverage purposes.

(e) Importation of spiritous or vinous liquor is prohibited until the amount on hand shall not be sufficient to supply the current need for non-beverage purposes.

(f) Spirituous liquors exported in the original packages may be reimported in such packages for redeposit in the distillery warehouse from which originally removed.

(g) The courts of Hawaii and the Virgin Islands are given jurisdiction to enforce the National Prohibition Act.

(h) Regulations to carry this act into effect are authorized.

(i) Revenue laws relating to the manufacture, taxation of and traffic in liquor shall remain in effect when not in conflict with the national prohibition act; and the prohibitive taxes and tax penalties provided in the national prohibition act shall be collected in the same manner as other taxes on liquor.

(j) Taxes on liquor stolen or destroyed shall not be collected from the owner if the loss or theft did not occur as a result of his negligence, connivance, collusion or fraud on the part of the owner or person legally accountable for the same.

(k) Private residences may not be searched without a search warrant. Officers who without probably cause and maliciously search any place without a search warrant are penalized. Persons who impersonate officers enforcing the prohibition act are heavily penalized.

A bill to Promote Efficiency in the U. S. Public Health Service was introduced by Senator Watson of Indiana, November 22, 1921, and referred to the Committee on Finance.

This proposed legislation is similar to the measure introduced in the House (H. R. 8566) by Mr. Dyer on October 19, 1921. It provides for the commissioning in the regular service of five hundred and fifty officers of the Reserve Corps of the United States Public Health Service. A system of promotions without any change in the present pay is established. A provision fixes the term of the Surgeon General at four years and limits his selection by the president from the commissioned personnel of the service. Seven professors of the hygienic laboratory are authorized and the organization of the corps of nurses, of dietitians and reconstruction aids is inaugurated. A complete outline of the officers of each corps with the pay for each are among the important features of the measure.

MISCELLANEOUS

We take pleasure in furthering publicity to the following report of the Joint Committee of the American Gynecological Society and the American Child Hygiene Association which was appointed to consider problems on Maternal Welfare. Constructive criticism is solicited and communications should be addressed to Fred L. Adair, M. D., Chairman, 739 La Salle Building, Minneapolis.

The Committee considers its proper functions to be:

A. Elaboration of a complete scheme of maternal welfare as ideally developed, emphasizing the most important points for starting the development of such a plan with the idea of educating the public to the necessity of this work and to serve as a basis for governmental activity. The following skeleton plan is presented:

1. Preservation of life and health of the mother.
   a. Decrease in the number of infections following abortion and childbirth.
   b. By providing better trained attendants.
   c. By educating the laity as to the proper preparation and necessity for proper supervision during pregnancy, etc.
   d. Inspection and control of institutions, etc caring for maternal cases.
   e. Prevention and treatment of venereal disease in association with pregnancy.
   f. Control of toxemias.

II. Increase in the number of fruitful pregnancies by
   a. Decrease in the amount of sterility.
      1. By diminution in the number of infections following abortion and childbirth.
      2. By diminution of venereal disease, especially G.C.
   b. Diminution in the number of abortions by
      1. Diminution in the number of spontaneous abortions by educating as to proper care when threatening symptoms develop.
      2. Diminution in the number of induced abortions.
         (a) Self induced.
         (b) Criminal operations.
         (c) Therapeutic abortions.

N. B. (1) We recommend that hospitals require the written sanction of at least two reputable medical men before permission to perform an abortion is granted.

2. We recornize the desirability of making abortions reportable to the health authorities.

c. Diminution of the number of premature birth deaths.
   1. Education and supervision.
   2. Provision for proper care of premature infants. Recognition and treatment of syphilis.

d. Dimunition in the number of stillbirths.
   1. Improvement of statistics and methods of reporting stillbirths with causes.
   2. Education of laity and profession.
   3. Provision of better antepartum and intrapartum care.
   4. Better care of syphilitics.

e. Diminution in the number of neonatal deaths.
   1. Recognition of the importance of these deaths.
   2. Methods of prevention.
   3. Education of laity and profession.
   4. Provision of better antenatal, intrapartum and postartum care.

N. B.—More careful scientific study of both stillbirths and neonatal deaths, together with causes of abortion, miscarriage and premature birth.

III. Better facilities for the care of the unmarried mother for her own protection and that of her offspring.

B. Definition of the relationship of this work to other health and welfare activities such as infant and child welfare; venereal disease campaign; antituberculosis; boards of health; Red Cross and nursing activities, as well as social agencies; certain eugenic problems.

C. To have some responsible agency of representative and well qualified men to advise with the governmental agencies on the problems of maternal welfare. This may be enlarged to become a part of a sort of institution or academy of sciences which could well be an advisory body on matters pertaining to public health and welfare.

D. It is particularly important to work out problems of maternal and child welfare in cooperation with the pediatrists, by means of a joint committee representative of the leading national societies. We recommend that this joint committee on maternal welfare work with one representing the American Pediatric Society to elaborate maternal and infant welfare programs.

PROCEEDINGS OF THE MINNESOTA ACADEMY OF MEDICINE

Meeting of January 18th, 1922

Dr. H. L. Staples, presiding

Dr. A. W. Abbott presented the following case.

Mrs. H., 89 years of age. A very well-preserved old lady. Taken five days before I saw her with pain in the left lower quadrant of the abdomen. Constipation resisting all laxatives and enemas. Slight nausea, progressive weakness, pulse 100, temperature normal, W. B. C. 19,000. Rectal and vaginal examination negative. Flouroscopy without barium showed a gas-distended colon approximately as found at the operation and a fairly distinct shadow at the point where the obstruction was found.

Abdomen opened on December 22, 1921, at midnight. The following conditions were found: large loop of descending colon and sigmoid one foot in diameter with a mesentery about eight inches long, dark purple in color. The colon within the loop was about three inches in diameter. The constriction reducing the two limbs of the colon to about one inch in diameter, consisted of a finger-like projection of omentum wrapped entirely about the colon. In addition to this there was a pedicle, like a long pedicle of an ovarian tumor which encircled the constricted area in an opposite direction to that of the omentum. The other end of this pedicle was attached to the bladder, though this was probably not its origin. After removing the omental strip it was found to be twisted on itself four complete turns. These encircling bands were released, followed immediately by the expulsion of gas and liquid feces. On further examination another pedicle with a tumor attached was found, which I show you, to the right side of the uterus.

My theory of the origin of this constriction is that the pedicle of a left ovarian tumor (which was not sought on account of the condition of the patient) first encircled the bowel, that the gradual extrusion of the bowel through the encircling pedicle gradually tended to lengthen the mesentery, and, finally, that the omental band subsequently was attracted to the injured part of the bowel. Why it should have been twisted is difficult to understand.

Dr. R. E. Farr, reported two cases and showed x-ray films.

Case 1. Jos. G., age 59, male, married. Maximal weight 170, present 125.

Present illness: Frequency, burning urination, urgency, dysuria, small stream.

History: Seven years ago began having difficulty in emptying the bladder. Later began to have frequency. Five years ago visited a well known Clinic, and had a diagnosis of cystitis made. Medicine and

irrigation relieved the condition somewhat. Two months before we saw him he began to have more difficulty in emptying the bladder, and four weeks later was once more examined, when a cystoscopic was done. A diagnosis of chronic cystitis and some disease of the sacral nerves was made.

The patient entered St. Mary's Hospital on September 9, 1921. The bladder was found distended with urine, and was emptied by the gradual method. The prostate was not enlarged. Urine contained blood and pus. A cystoscopic examination, under sacral anesthesia, showed the following: chronic cystitis, gold hole ureter on the left, contracted white meatus on the right. Ureteral catherization resulted in the finding of blood and pus from both ureters. Pyelograms and ureterograms (plates shown) showed: double hydronephrosis, double hydro-ureter.

The right ureter was dilated by the simultaneous introduction of two catheters. After the first successful attempt it was found impossible to introduce an instrument of any kind into the left ureter. The patient was drowsy and uremic from the time he entered the hospital, and the phthalein output varied from day to day, averaging between 20 and 40 per cent.

After dilatation of the right ureter the patient improved somewhat. On October 15th, a suprapubic cystostomy was done under local anesthesia, which had been preceded by sacral anesthesia. The right ureter was widely dilated with a series of urethral sounds. An effort was made to enter and dilate the left ureter, but it was unsuccessful, and, on account of the pateint's condition, further operative measures were not attempted.

On November 5th, almost two months after entrance, the left ureter was exposed under local anesthesia, and an effort made to introduce an instrument into the bladder, from above through the ureter. This effort being unsuccessful, a dressing forceps was introduced through the cystostomy wound and made to impinge upon the bladder fundus, which was then incised and a catheter drawn through, with its end projecting through the cystostomy wound. The ureter was then opened at a favorable point above the stricture and the upper end of the catheter inserted well into the dilated portion of the ureter. A vesico-ureteral anastomosis was thus established by anchoring the ureter to the bladder wall with chromicized gut. The first ureteral incision was then closed and the incision in the abdominal wall closed, with cigarette drains.

From this time the patient rapidly recovered. The catheter was withdrawn in ten days and the suprapubic wound healed. Our last report of the patient showed he had gained 35 pounds, now weighing one hundred and sixty.

Case 2. Frank K., age 11, male. Entered St. Mary's hospital, November 18, 1921.

History: At 3:30 p. m. while partially lying down on a couch and reading, a boy companion shot him with a Number 22 rifle. The bullet entered the left upper abdomen just below the diaphragm in the axillary line and lodged in the opposite side in the right flank, above the iliac crest. The boy was seen in consultation at 9 o'clock p. m., and was operated upon as soon as the operating room could be prepared.

Infiltration anesthesia, transverse incision, cutting off both recti. The stomach showed a perforation in the greater curvature at the left side. The perforation was closed with catgut. The stomach showed another perforation in the lesser curvature two inches above the pylorus. A third perforation showed in the lower surface of the duodenum. From here the bullet traversed the transverse colon, which showed two perforations, and lodged in the abdominal wall. A thorough search was made for a fourth perforation in the stomach and duodenum, but no other opening could be found.

Drainage was used in the greater and lesser peritoneal cavities and the boy made a fair recovery, although he developed considerable fever and there was a good deal of discharge of pus from the drainage openings. The patient felt fine up to the 12th day, when he became pale, and his pulse rapid, rising to 100, 120, and finally to 140. He passed a large black, tarlike stool. His pulse then dropped to 110. A few hours later he began to vomit red blood, and was given a transfusion of 450 cc., the father acting as donor, the citrate method being used. The pulse dropped to 100 and his condition seemed satisfactory in every way. The next night, practically thirty-six hours after the first hemorrhage, he went into collapse, and had every evidence of internal hemorrhage. A second transfusion was made, a similar amount being used, but from a different doner. During the administration of the blood there was considerable reaction. The patient felt chilly, the pupils became moderately dilated, and he had some disturbance of respiration. The introduction was made slowly, and the child quited down and seemed to take the last portion of the blood without any disturbance. The patient collapsed a few hours later and died suddenly. Whether the patient died of hemorrhage, or anaphylaxis, or both, could not be positively decided.

Autopsy showed the abdominal wound healed, excepting at one point, where drainage was still taking place. The peritoneal cavity contained some fluid. There was only slight evidence of peritonitis about the field of operation. The liver edge contained a small abscess. Both pleural cavities contained dark colored fluid.

The interesting point about this case, and my reason for reporting it, is to call attention to the reason why but three openings were found in the peritoneal wall of the stomach. The bullet entered the greater curvature on the left, traversed the mucous membrane of the lesser curvature, where it dipped down

and caught the serous surface of the stomach. It did not leave the stomach, but traveled on beneath the mucous membrane, leaving the stomach through the pyloric opening, emerging again through the duodenum, thus making but three wounds in the serous coat. The gastric hemorrhage occurred from a large ulcerated surface in the mucous membrane, where the bullet had pierced it. The stomach was found full of blood at autopsy, and below the stomach many feet of intestine were empty and collapsed, while the colon and lower ileum were completely filled with blood, evidencing the fact that the child had had two separate hemorrhages.

Comments: Under similar conditions it would perhaps be advisable to enlarge the bullet wound and more carefully suture the layers of the stomach wall; and, furthermore, as the ulcerated surfaces are perhaps the result of digestive processes, neutralization of the gastric contents during convalescence might seem advisable in these cases.

Dr. Walter R. Ramsey reported the following case.

I would like to report a case of meningitis in a boy, which the pathologist pronounced pneumococcus meningitis. If it was that, it is perhaps the first one on record to get well.

I saw him first on Christmas afternoon. Patient was a little Italian boy, apparently suffering from meningitis. His head was markedly retracted. We did a lumbar puncture at his home in the Italian quarter. The fluid was very turbid. Sent him directly to the City Hospital and Dr. Stewart and I examined the fluid. The next day we sent him to the contagious service at the City Hospital so he was out of my hands, but I called up the next day to find out about the report and the pathologist said at once that it was the pneumococcus type and gave the child four days to live. When I went on service again January 1st the boy was back on the children's service, having been transferred from the contagious ward. The little fellow was sitting up and apparently quite normal. The pathologist insists that it was the pneumococcus. We have sent some of the fluid to other places for examination, because if it was the pneumococcus it is a rare case. Dr. Holt reports a case which apparently recovered but died three months later, and when Dr. Apt was here recently I asked him about it and he said he had seen one get well but that there was still some discussion regarding the diagnosis.

The next case I wish to report is a case of suddenly enlarged thymus. Young baby 8 or 9 months old and a very healthy normal child. Suddenly seized with dyspnea. The next day Dr. Stewart saw the child, who was a patient of Dr. Geist, and the picture presented was very interesting. The baby was breathing only very superficially, there being little or no movement over the right chest and very little on the left. No respiratory murmur on the right side and very little on the left. Baby was extremely pale.

I felt sure it was a case of enlarged thymus and, knowing what wonderful results we get in asthma with adrenalin, I suggested that we give the baby 5 minims of it. Much to our surprise, in 10 or 15 minutes that baby was breathing immensely better. We followed that with very marked restriction of all fluid, and the child has quite recovered.

This exactly fits in the picture which other authors have described which proved to be enlarged thymus. I have not seen the use of adrenalin advocated before but it certainly acted like magic.

Dr. J. T. Christison reported a case of pneumococcic meningitis complicated by acute appendicitis with recovery.

The patient, a boy 4 years of age, was taken ill October 26th with vomiting and headache. The following day his mother noticed retraction of the head and thought his eyes were converged. He was admitted to the hospital on October 30th with marked retraction of the head and a temperature of 102 degrees.

Examination of the urine showed a trace of albumin and a few hyalin casts. The leucocyte count at this time was 25,900. An examination of the spinal fluid showed a cell count of 2,100 per cu. mm. Differential: p. m. n. 82 per cent; lymph. 15 per cent; and transitionals 3 per cent. A culture of this on broth showed the infecting organism to be a pneumococcus.

On the day of admission following the spinal puncture 15 c.c. of anti-meningococci serum was administered, and on the following day 15 c.c. of anti-pneumococcic serum was administered intraspinally, and 20 c.c. intramuscularly. On the following day 15 c.c. of anti-pneumococcic serum was administered intraspinally and 35 c.c. intramuscularly. On November second 15 c.c. of anti-pneumococcic serum was administered intraspinally. The child up to this time had been receiving continuous proctoclysis. From November 3rd to November 11th nine spinal punctures were done, and cultures made from each gave no growth. On the evening of November 12th the child complained of abdominal pain and when seen the following day there was marked rigidity of the right rectus muscle with pronounced tenderness, and a diagnosis of acute appendicitis was made. At 2:15 the same afternoon Dr. Zimmerman opened the abdomen and found an appendicial abscess containing about two ounces of thick yellow, foul-smelling pus. Culture from this also showed the presence of pneumococci. Recovery from this date was uneventful, and the child left the hospital on December 15th and has remained well.

Dr. E. T. F. Richards read a paper entitled "An Electrocardiographic and Clinical Investigation of the

Therapeutic Value of Camphor," by E. T. F. Richards and Dr. R. Edwin Morris.

Discussions by Dr. Morris, Dr. S. M. White, Dr. F. W. Schultz, Dr. W. A. Jones, and Dr. Richards.

Dr Morris:

The experimental work for this paper was done at the University of Minnesota on the same basis as the digitalis work we have carried on for some years, using the Hatcher-Brody cat method of biochemic standardization, modified to our use, and graphically recording the cardiac, respiratory and blood pressure changes as they occur. The animals are attached to tables, anesthetized just sufficiently to keep them quiet. A normal record is made, then the solutions are introduced into the femoral vein at a definite rate, and other records are frequently made noting any change in the action of heart or respiration. Notation is made of the various events as they occur.

The marked feature observed in the camphor series were the twitchings, the convulsive seizures and then the toxic period in which there appears complete heart block; respiration stopping first, the ventricles stopping before the auricles and exhibiting periods of ventricular fibrillation with gradual periods of ventricular "stop," the auricles continuing for some time as evidenced by the graphic records. In a number of animals unsuccessful attempts were made to restore cardiac action by various methods.

It was surprising to note the amount of cotton seed oil which, used as a control, could be injected without any evidence of embolus or injury. The animal would be saturated with oil which, on autopsy, appeared in every organ. The camphor solutions had a distinct camphor action, only slower in producing the lethal period.

From this work we can say definitely that camphorated oil does not produce cardiac stimulation; given in greater doses it produces definite toxicity. It has no definite place among stimulants. The use of camphorated oil in pneumonia has given no real results and the concensus of opinion is in accord with the report of Glaukner (Calif. State Med. Jour., May 1920) who reports its use in 50 cases as "no better results with use of comphorated oil than in series of cases without its use, the mortality 29 per cent in both series."

One observation made in these experiments was the action of camphor in making animal blood coagulate much more rapidly. I find in "Zeitschrift fur TB," August 1920, p. 276, Zehner reports camphorated oil (20%) "a sovereign means of arresting hemoptysis, in doses of 15 to 30 gms."

Dr. S. Marx White:

The Academy is to be congratulated on having a paper of this character read before it.

As this type of work has been carried on in recent years one after another of our therapeutic idols seem to have fallen, and camphor also, as a cardiac stimulant, must be relegated to the discard. One point of interest is the clear way in which the animal experiments bring out the toxic and fail to reveal a stimulating action of camphor.

The clinical test, or the careful application of criteria such as were applied by the essayists to the clinical part of the problem, is of much greater value in its solution than are the animal experiments The Electrocardiograph is limited in the information it can give but it does give definite information of a depressant action, or what Dr. Morris called a toxic action of camphor. But caution must be exercised in the transference of the results of animal experimentation to man. The animal experiment may guide us in our studies in man but it must not supplant the study in man, nor should we be led into a wholesale acceptance of the results of animal experimentation as transferable to man. This erroneous process has frequently led us into error and it led us into a serious error many years ago in the case of digitalis. Animal experiments at that time showed that toward the end of a period of administration of lethal doses of digitalis in animals there was a distinct rise in blood pressure. For a long time it was thought that such a rise in blood pressure occurred in the therapeutic use of digitalis, but it was not until Eggleston four years ago studied the problem clinically that it was shown that no considerable rise in blood pressure occurred in man with the therapeutic use of the drug.

The study of digitalis as it has been made by cardiologists with the use of the electrocardiograph has given us this information, that digitalis has a depressing action on certain functions of the heart principally on the function of conduction of stimuli, and because it does depress this function it has found a very legitimate field in heart therapy, i. e., in auricular fibrillation. Much of our use of digitalis in the past has been on a basis of false understanding of its effects. Withering, who rescued the drug from the herb doctors of his time and gave it to the medical profession, probably used it more intelligently and with clearer indications than his successors of the past century. It is only since the pharmacologist and the electrocardiographer have cleared it of much if its mystery that clear indications for its use have again emerged. A heart murmur is no longer an indication. It is so with many other drugs now being subjected to scrutiny.

So our therapeutic problem is being surrounded here and there and forms of evidence are being secured that we can actually rely on.

Dr. F. W. Schultz:

Several years ago I carried out some experimental work on the action of camphor on dogs who had been starved for a definite period. It seemed to me that the toxic symptoms occurred more readily the longer the dog was starved. There seemed to be a definite ratio between the period of starvation and the development of the symptoms. I did not have the use of an electroradiograph at that time. This instru-

ment was then almost unknown, or, at any rate, very little used.

I had a little interesting personal experience in Europe while I was doing some experimental work there. I took two cubic centimeters of camphor in oil before breakfast, and in a comparatively short period developed rather alarming symptoms, so much so that the hospital authorities became quite concerned. My skin became cold and clammy. There was marked nausea, dilated pupils, my hands were very unsteady so that I could not write for several hours, and the gait became staggering. There was profound depression for a considerable time. The symptoms then subsided, and left no ill effects after six or seven hours.

These symptoms may have been due to an idiosyncrasy to the drug, but I surely had a definite impression at the time that camphor was a drug capable of producing rather pronounced symptoms and that its use was probably not altogether harmless.

Dr. W. A. Jones:

Before pronouncing the final eulogy on camphor and congratulating Drs. Richards and Morris and other noted authorities on digging the grave and filling it in so that camphor may die, I should like to ask that Dr. Richards be permitted to tell us the effect of spirits of camphor put on the handkerchief of the old lady.

Dr. Richards:

Our work on the effect of camphor on emaciated animals is confirmed by the work of Dr. Schlutz, and for that reason the drug should not be administered to patients who are at all emaciated.

I rather think that Dr. Jones question is answered by those who believe that there is a reflex vasomotor effect and that we may get such effects from camphor.

NEW AND NON-OFFICIAL REMEDIES

During January the following articles have been accepted by the Council on Pharmacy and Chemistry for inclusion in New and Nonofficial Remedies:

The Abbott Laboratories:
Butyn.

G. W. Carnrick Co.:
Solution Post-Pituitary.

Parke, Davis and Co.:
Pituitrin "O".

NEW AND NONOFFICIAL REMEDIES

Liquid Petrolatum-Squibb, Heavy (California).—A brand of liquid petrolatum—U. S. P.,*made from California petroleum and claimed to be composed essentially of hydrocarbons of the naphthene series. For a description of liquid petrolatum, see the U. S. Pharmacopeia and Useful Drugs. E. R. Squibb and Sons, New York.

Chaulmoogra Derivatives.—Chaulmoogra oil is a fixed (fatty) oil. In addition to small quantities of the glycerides commonly found in fats, chaulmoogra oil contains the glycerides of a series of highly unsaturated fatty acids, chiefly chaulmoogric acid and hydrocarpic acid. The therapeutic properties of chaulmoogra oil appear to be due to these unsaturated fatty acids. Chaulmoogra oil is used in the treatment of leprosy, the bulk of the evidence indicating that it is of value though it does not have specific curative properties. Chaulmoogra oil is given by mouth or hypodermic injection. The sodium salts of the fatty acids of chaulmoogra oil and the ethyl esters prepared from these fatty acids have been used in the treatment of leprosy with claims that they are better tolerated than the oil.

Chaulmoogra Oil.—Oleum Chaulmoograe.—For actions and uses, see the preceding article "Chaulmoogra Derivatives." The dose is 0.3 Cc. (5 drops) in capsules, three times daily, the dose being increased to the point of tolerance. For hypodermic injection it has been used mixed with olive oil.

Chaulmestrol.—Ethyl esters of the fatty acids of chaulmoogra oil. For a discussion of the actions and uses, see the preceding article "Chaulmoogra Derivatives." Orally, chaulmestrol is administered in gradually increasing doses of from 1 Cc. to 5 Cc. Intramuscularly, 1 Cc. is the initial dose. The Bayer Company, New York (Winthrop Chemical Company, Inc., New York, distributor). (Jour. A. M. A., Jan. 14, 1922, p. 111.)

Food Allergens-Squibb.—Powders representing the protein of foods. For action, uses and dosage, see general article, "Biologically Reactive Food Proteins," New and Nonofficial Remedies, 1921, page 65. The following allergens have been accepted: Almond Allergen-Squibb, Barley Allergen-Squibb, Brazil-Nut Allergen-Squibb, Buckwheat Allergen-Squibb, Butternut Allergen-Squibb, Chestnut Allergen-Squibb, Corn Allergen-Squibb, Filbert Allergen-Squibb, Hazelnut Allergen-Squibb, Hickory-Nut Allergen-Squibb, Oat Allergen-Squibb, Peanut Allergen-Squibb, Pecan Allergen-Squibb, Rice Allergen-Squibb, Rye Allergen-Squibb, Walnut (Black) Allergen-Squibb, Walnut (English) Allergen-Suibb, Wheat Allergen-Squibb, Apple Allergen-Squibb, Artichoke Allergen-Squibb, Asparagus Allergen-Squibb, Banana Allergen-Squibb, Blackberry Allergen-Squibb, Black Pepper Allergen Squibb, Bean (Lima) Allergen-Squibb, Bean (Navy) Allergen-Squibb, Bean (String) Allergen-Squibb, Beet Allergen-Squibb, Cabbage Allergen-Squibb, Cantaloupe Allergen-Squibb, Carrot Allergen-Squibb, Celery Allergen-Squibb, Cherry Allergen-Squibb, Coffee Allergen-Squibb, Cucumber Allergen-Squibb, Eggplant Allergen-Squibb, Grape Allergen-Squibb, Grapefruit Allergen-Squibb, Lettuce Allergen-Squibb, Mustard Allergen-Squibb, Onion Allergen-Squibb, Orange

Allergen-Squibb, Parsnip Allergen-Squibb, Pea Allergen-Squibb, Peach Allergen-Squibb, Pear Allergen-Squibb, Plum Allergen-Squibb, Potato (Sweet) Allergen-Squibb, Potato (White) Allergen-Squibb, Prune Allergen-Squibb, Radish Allergen-Squibb, Raspberry Allergen-Squibb, Rhubarb Allergen-Squibb, Spinach Allergen-Squibb, Squash Allergen-Squibb, Strawberry AllergenSquibb, Tomato Allergen-Squibb, Turnips Allergen-Squibb, Watermelon Allergen-Squibb, Beef Allergen-Squibb, Bluefish Allergen-Squibb, Chicken Allergen-Squibb, Clam Allergen-Squibb, Codfish Allergen-Squibb, Crab Allergen-Squibb, Goose Allergen-Squibb, Haddock Allergen-Squibb, Halibut Allergen-Squibb, Horse Allergen-Squibb, Lamb Allergen-Squibb, Lobster Allergen-Squibb, Mackerel Allergen-Squibb, Mutton Allergen-Squibb, Oyster Allergen-Squibb, Pork Allergen-Squibb, Salmon Allergen-Squibb, Shrimp Allergen-Squibb, Sweetbreads Allergen-Squibb, Turkey Allergen-Squibb, Veal Allergen-Squibb, Milk (Cow) (All Proteins) Allergen-Squibb, Milk (Goat) (All Proteins) Allergen-Squibb, Milk (Human) (All Proteins) Allergen-Squibb, Milk (Cow) (Casein) Allergen-Squibb, Milk (Cow) (Albumin) Allergen-Squibb, Egg (White) (All Proteins) Allergen-Squibb, Egg (Yolk) (All Proteins) Allergen-Squibb, Egg White Albumin Allergen-Squibb, Egg (Whole) (All Proteins) Allergen-Squibb, Wheat (Gliadin) Allergen-Squibb, Orris Root Allergen-Squibb. E. R. Squibb and Sons, New York (Jour. A. M. A., Jan. 21, 1922, p. 192).

Pollen Protein Allergens-Squibb. — Powders consisting of the sodium chloride-soluble protein of the isolated pollen from various species of plants. The Pollen Protein Allergens-Squibb are intended only for diagnosis. For action, uses and dosage, see general article, "Pollen Extract Preparations," New and Nonofficial Remedies 1921, page 239. The following allergens have been accepted: Corn Pollen Allergen-Squibb, Goldenrod Pollen Allergen-Squibb, Orchard Grass Pollen Allergen-Squibb, Ragweed Pollen Allergen-Squibb, Rye Pollen Allergen-Squibb, Timothy Pollen Allergen-Squibb, E. R. Squibb and Sons, New York (Jour. A. M. A., Jan. 21, 1922, p. 192).

Neocinchophen-Abbott.—A brand of neocinchophen—N. N. R. For action, uses and dosage, see New and Nonofficial Remedies, 1921, p. 86. The Abbott Laboratories, Chicago (Jour. A. M. A., Jan. 21, 1922, p. 192).

PROPAGANDA FOR REFORM

Heliotherapy and Rickets.—Evidence for the value of heliotherapy in rickets was presented years ago. This value has recently been verified by experiments on animals rendered demonstrably rachitic through dietry errors. When rats have an abundance of sunlight, they remain healthy under regimens which are sufficiently deficient in phosphorous to induce rickets in animals kept in subdued light. It has been shown that the change produced by sunlight on the skeleton do not differ in any important respect from the changes produced when animals are fed cod liver oil. Again, sun treatment of infants suffering from rickets, not only brings about a cure of the rachitic lesions, but in so doing occasions chemical changes in the blood similar to those noted when the cure is effected by cod liver oil. Heliotherapy has thus in one case at least been put upon the scientific basis of demonstrable chemical changes in the organism affected (Jour. A. M. A., Jan. 21, 1922, p. 195).

Western Medical Association Treatment for Epilepsy.—The Western Medical Association, Chicago, is selling a mail-order treatment for the alleged cure of epilepsy. The A. M. A. Chemical Laboratory examined the "Treatment" and found the essential constituent to be phenobarbital (luminal). The Laboratory reports that the "Treatment" is sold in three boxes, A, B and C. "A" contained tablets, each of which represented 0.66 gm. (1 grain) of phenobarbital (luminal), "B" contained tablets which are of the type sold by pharmaceutical houses as "digestive tablets" and contained pepsin, pancreatin and calcium lactophosphate, "C" contained tablets which gave tests for emodin-bearing drugs and for aloin. In addition to the epilepsy treatment, the Western Medical Association also sells a number of other nostrums for the treatment of various diseases. Apparently, two men are mainly concerned in operating the Western Medical Association, namely, Joseph B. Creevy and Dr. W. W. Lister, a physician (Jour. A. M. A., Jan. 28, 1922, p. 296).

Antidote for Phenol Poisoning.—Sodium sulphate in strong solution is one of the best known antidotes for phenol poisoning. The action is not a chemical one. Alcohol is not an antidote for phenol poisoning. Experiments carried out in the U. S. Hygienic Laboratory showed that the toxicity of phenol was increased by alcohol. Alcohol is applied to the appendix stump after operation in the belief that it will neutralize the action of the phenol and thus prevent extensive sloughing of the tissues; but no doubt the action of the alcohol is simply that of diluting and washing away the phenol (Jour. A. M. A., Jan. 28, 1922, p. 299).

Pinuseptol.—According to the catalog of Eli Lilly and Company, Pinuseptol is a "Pine Oil Disinfectant." The Bureau of Chemistry of the U. S. Department of Agriculture has investigated the general subject of the use of pine oil as a disinfectant. It reports that emulsions made from pine oil when freshly prepared give a Hygienic Laboratory phenol coefficient of from 3.42 to 4.34. It was found that pine oil emulsions failed to kill M. aureus and B. anthracis; the government chemists conclude that these products should not be used for general disinfecting purposes (Jour. A. M. A., Jan. 28, 1922, p. 299).

PROGRESS

Abstracts to be submitted to Section Supervisors.

MEDICINE

SUPERVISORS:

F. J. HIRSCHBOECK,
DULUTH CLINIC, DULUTH

THOMAS A. PEPPARD
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EPINEPHRIN HYPERSENSITIVENESS AND ITS RELATION TO HYPERTHYROIDISM: Peabody, Sturgis, Tompkins and Wearn. (Amer. Jour. Med. Sc., April 1921.) The authors have made an effort to establish the specificity of the Goetsch test in hyperthyroidism. They believe that with properly selected dosage and proper criteria for estimating the response, they can differentiate rather well so called "negative" and "positive" reactions, although in certain instances "doubtful" reactions are obtained. The nature of the reaction is unknown, but it seems to be due to a stimulation of the sympathetic nervous system by the epinephrin. Theoretically, a "positive" reaction would indicate hyperactivity of the thyroid, of the adrenal gland or of the sympathetic nervous system, or a lowered threshold of response of the sympathetic system. These conditions, however, with the exception of hyperthryoidism, are largely hypothetical, but yet they probably do occur, so that varing causes may account for a positive reaction. They find that the reaction is not invariably found, even with a clinical picture of hyperthyroidism or with increased basal metabolic rates. They also found a hypersensitiveness in persons who had no hyperthyroidism; for example, in 50 per cent of patients convalescent from acute infections, in psychoneurotics, and in soldiers affected with "effort syndrome," as well as in 14 per cent of apparently normal young men. A positive reaction appears to occur most often in nervous individuals, but is not constant. The clinical significance of the reaction is not definite, and cannot at the present time be regarded as having specific significance in the diagnosis of hyperthyroidism.

F. J. HIRSCHBOECK.

AN AUSCULTATORY SIGN OBSERVED IN ACUTE ABDOMINAL DISEASES: Paul W. Aschner. (Amer. Jour. of Med. Sc., Nov. 1921.) The writer has employed stethoscopic auscultation on the abdomen in acute cases, mostly appendicitis, believing that some information might be obtained therefrom. His conclusions are drawn from findings in twenty cases observed by himself.

On patients presenting these auscultatory signs, it was found that the peritoneal cavity when open contained free pus, sero-purulant fluid or blood (the latter in a case of ruptured tubal pregnancy). The findings were not found in ascites uncomplicated by any inflammatory factor. It was also tried in patients in the Surgical ward without abdominal disease, and in no instance was the sign encountered, although occasionally heart sounds were audible in the epigastrium, but not as universally as in the acute abdominal cases.

The technique of the test is simple. A stethoscope is employed in the four quadrants of the addomen, and the heart sounds and inspiratory murmurs listened for. In seventeen cases the auscultatory sign was positive, in two or more quadrants, which the writer believes a characteristic feature, with positive corroboration at operation. In a recent case of acute perforating appendicitis, with free pus in the abdominal cavity, the reviewer has found the sign to be positive, and further observation may prove the test to be of some value as a differential diagnostic aid.

F. J. HIRSCHBOECK.

DIAGNOSIS AND CLINICAL MANIFESTATIONS OF CARDIOSPASM ASSOCIATED WITH DIFFUSE DILITATION OF THE OESOPHAGUS: Smithies. (Am. Jour. Med. Sc., Sept. 1921, p. 313.) The author reports his observations during the past seven years on seventy-six cases of cardiospasm associated with diffuse dilation of the oesophagus. He differentiates "spasm at the cardia" which is a transitory spasm and is not associated with dilitation of the oesophagus, from true cardiospasm. The latter is characterized by strong and prolonged contraction of the cardiac sphyncter, accompanied by hypertrophy of the cardiac ring and resultant diffuse dilitation and sacculation of the lower end of the oesophagus. The oesophageal wall is usually thickened, due to actual work, hypertrophy, and frequently, ulceration or disease of the mucosa is present. A good description of the symptomatology is given. The quantity and danger of bouginage with an unguided force in cases where the lower portion of the sac lies below the level of the cardiac sphyncter is pointed out. The importance of the silk thread as a guide to the bougie or dilation force is emphasized. Fluoroscopy and Roentgenograms in different positions are of great importance in the diagnosis of cardiospasm, but the evidence is not infallible. Clinical and functional recovery is reported in 70 per cent of cases following divulsive treatment; improvement occurs in 20 per cent; about 10 per cent are not permanent ly benefited by any form of treatment and for these gastrostomy may be required to save life.

P. H. ROWE.

SURGERY

SUPERVISORS:
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AN ANALYSIS OF 102 CASES OF TUMORS OF THE BREAST: Randolph Winslow, (Ann. Surg. Sept. 1921.) The author in 1911 tabulated 100 cases of lesions of the breast, occurring in the University Hospital, Baltimore, and found that 63 were carcinomata, 3 sarcomata, 20 fibro-adenomata, 1 pericanalicular myxoma, 5 cystic fibro-adenomata, 2 galactoceles, 3 tubercular mastitis, and 3 abscesses.

The incidence of carcinoma compared with all other tumors of the breast is between 60 per cent and 80 per cent as shown by most observers. In a series of 102 cases of lesions of the breast observed at the University Hospital during 1917, 1918, and 1919, 61 were carcinomata, 3 sarcomata, 18 benign solid growths and 20 benign cystic growths.

Of the 61 carcinomata six cases occurred before 35 years of age, the youngest was 23 years old. The tumor was located in the upper and outer quadrant in twenty-two cases, upper and inner quadrant four cases, lower and outer four cases, lower and inner one case, central three, general eight, and the rest not recorded.

From his analysis the author concludes in part, that he is still of the opinion that carcinoma is the predominant neoplasm of the mammary gland and that it occurs in from 60 to 65 per cent of all mammary tumors. Sarcoma occurs in about three per cent of tumors of the breast, is malignant and should be treated in as radical a manner as a carcinoma. Non-malignant neoplasms occur in about 35 per cent of all cases. No woman should be allowed to harbor a neoplasm in her breast whether it be benign or malignant, or whether the patient is old or young. Benign tumors tend to become malignant, and the time to remove them is while they are still benign.

V. C. HUNT.

THE SURGICAL TREATMENT OF ACUTE PELVIC INFECTIONS IN WOMEN: F. G. Dubose, Surg. Gyn. and Obst., Sept. 1921, Page 299-307.) It is estimated that seventy-five per cent of invalidism in women arises from pelvic infection. The author urges earlier and more radical operative treatment in this disease, especially in acute exacerbations and in the primary attack.

Recurrence of pelvic abscess after drainage through the cul-de-sac has been the rule; such procedure draining but one of the many pus pockets in the pelvis.

The author is prompted to do very radical surgery in these cases instead of waiting and adds that however much the cul-de-sac is bulging with pus, the patient is operated upon through a median lower abdominal incision, so that all the diseased tissue can be examined and treated surgically.

Pus pockets by no means regularly become sterile. Years after the onset of the infection many of these cases develop acute, spreading, or general peritonitis. The greatest error in the operative treatment of these cases is insufficient surgery and inadequate drainage. The author believes that the mortality and morbidity following the nonoperative, the expectant plan, and the conservative-surgical is high.

The author's plan for the treatment of these cases follows: Immediate operation is done on all cases which present the syndrome of acute surgical pelvis, if first seen within twelve hours after the onset of the infection. If first seen twelve or more hours after onset a varying period of some hours of observation is followed, during which time absolute rest is given the patient, as compatible as possible with the routine and repeated examinations. During this time the most minute and painstaking examinations are made to determine the general condition of the patient. These examinations include blood count, bacterial examination to determine the type of organism one is combating, and any others that may throw light on a remote or complicating disease such as the x-ray and cystoscopic examination. During this time the patient is supported by proctoclysis and hypodermoclysis of saline solutions containing glucose. In the most acute cases, if seen before the eighth day after the onset, the author advises deferring of operation:

1. If the condition is apparently stationary or the symptoms take a more favorable turn during the six or twelve hours consumed in the preliminary study of the case;

2. When the blood examination reveals a high polymorphonuclear count without an accompanying leukocytosis or in the absence of an increasing number of leukocytes;

3. From the third to the seventh day after onset—when the severity of the peritonitis is at its height and the rest method is being given a chance to have effect—then the operation should be withheld in the absence of an exigency until the more acute general symptoms have subsided.

Do not defer operation:

1. In the presence of a progressive exaggeration of unfavorable symptoms during the period of rest. observative and expectant treatment;

2. If there is sudden relief of pain with a subjective sense of improvement, accompanied by an acceleration in pulse rate and frequently by a lowering temperature, usually indicating thrombosis or rupture of a localized abscess.

3. When there is a sudden fall in a previously high leukocyte count or a decreasing number of

leukocytes and an increasing percentage of polymorphonuclears, which indicates a falling resistance.

4. When more than a week has elapsed since the onset of the infection, for the zlood during this period of time will have developed, in all probability, a degree of immunity to the limit of its opsonic power.

5. When a mass appears in the pelvis—evidence of the localization of the infectious process by adhesions within a circumscribed area.

The technique of operating on cases of pelvic infection is given by the author, who lays special stress on certain features.

Pelvic debridement is urged, at least the pyogenic membranes with infected tubes, uterus and ovaries should be removed. Gauze packs are applied over denuded pelvic surfaces to stop oozing and to hinder capillary absorption. Eroded or denuded intestinal surfaces are peritonized or overlaid with omentum. Rubber dam covers the gauze packs and the pelvic operative field, minimizing the formation of adhesions and drawing freely and continuously.

In 255 pelvic inflammatory cases operated upon consecutively there was one death. One hundred and sixty-three have been followed up, of which 137 or 84 per cent are cured; 18 or 11.1 per cent are improved; 8 or 4.9 per cent not improved; average hospital days 23.3, including one neurotic, who spent 109 days in hospital.

Case reports, tables of one hundred and sixty-three cases whose post-operative course has been followed and an axiomatic review in parallel conclude the article.

FRED R. SANDERSON.

GYNECOLOGY AND OBSTETRICS

SUPERVISORS:
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A PRELIMINARY REPORT ON THE TREATMENT OF SYPHILIS COMPLICATING PREGNANCY. A. C. Beck. (The Am. Jour. Ob. and Gyn., Vol. II, No. 4.) This report includes a small group of cases which have been carefully studied, and brings out several striking points.

Diagnosis: A history of previous lesions and the physical examination gave the correct diagnosis in only six cases or 18 per cent. The history of previous pregnancies was suggestive, since over 60 per cent had had previous miscarriage, stillbirths, or had given birth to a living syphilitic fetus. The routine Wassermann must be carefully checked by repeated tests. The microscopical examination of the placenta is most important.

Treatment: Each patient received weekly injections of salvarsan, 4 decigrams with mercury for six weeks, followed by mercury for six weeks more. The entire course was repeated if the Wassermann remained possitive. It is necessary to check the urine carefully during treatment. The newborn babies receive daily mercury rubs for two months. If the Wassermann is then negative no further treatment is given except in case of definite indications. The babies whose mothers had received incomplete prenatal treatment require more intensive therapy.

Results: Four cases received no theatment and gave birth to; one healthy living baby and three living syphilitic babies. Eleven patients received from one to three salvarsan injections; there were five living healthy babies, three living syphilitic and three dead syphilitic babies. Seventeen patients received five or more injections of salvarsan of which fourteen bore healthy living babies, two living syphilitic, and one dead syphilitic baby.

ARCHIBALD L. McDONALD.

PEDIATRICS

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THE SPECIFIC TREATMENT OF DIPHTHERIA. E. C. Fleischner, and E. B. Shaw. (Arch. of Ped., Oct. 1921). Following the work of Schick in 1913 the relative immunity to diphtheria at different ages has been constantly proven. Within individual limits the susceptibility to the disease under five years of age is very great. The mortality from diphtheria depends absolutely upon the rapidity with which the diagnosis is established and the promptness with which proper and effective treatment is instituted. The layman should be taught to consider all sore throats diphtheritic until they are proven otherwise. The physician should automatically take a culture in the presence of an exudate, however small. The clinical picture in incipient tonsillar diphtheria may be one that the most skilled diagnostician cannot differentiate without the aid of the laboratory. Chronic or acute nasal discharges, particularly when bloody in character, are also potentially due to the Klebs-Loeffler bacillus until proven otherwise. Progressive aphonia with a cough coming on acutely, particularly in children under two years of age, should be accepted as evidence of a probable diphtheritic infection and treated as such. One of the most reprehensible forms of neglect is that in which the treatment of evident clinical diphtheria is delayed, either because the report on the culture has not been made, or having been made and not found, too much credence is given to the value of the negative diagnosis. In a general way the rule may be made that culture taking can only be satisfactory when the operator sees exactly what he is doing, and

does not dig at the throat, as is only too frequently the custom. Cultures taken in this way are more reliable but even then they cannot always be depended upon. Medical advisors, whose patients recover when the administration of the antitoxin is delayed and the dose too small, should not delude themselves as to their efficiency. The natural antitoxin in the blood stream of the sick child has only too often protected the patient against the ignorance of a poor practitioner.

Twenty thousand units of antitoxin subcutaneously are necessary to produce the same effect in preventing the development of a positive Schick, as is achieved by 1,000 units intravenously. It would seem as if very little further argument were necessary to prove the statement, that the prognosis in any case of diphtheria depends upon the rapidity with which antitoxin can be made available to the tissues.

The successful treatment of diphtheria depends absolutely and unequivocally upon the earliest possible administration of sufficient antitoxin by that method whereby it can be made most readily and most rapidly available to the tissue cells. This is accomplished by the intravenous method. When this intravenous method cannot be used, from twice the amount in the mild cases to four times the amount in the severe cases should be given in a single injection by the intramuscular method. The subcutaneous injection of antitoxin should never be used in the treatment of diphtheria. Mild and early cases should be kept in bed two weeks Severe and late cases should be kept in bed from four to eight weeks, depending upon the heart musculature and evidences of nerve involvement.

Finally, give antitoxin early, give it in sufficiently large doses, and by the intravenous method.

R. N. ANDREWS.

A CRITICAL CONSIDERATION OF THE FOUR-HOUR NURSING AND FEEDING INTERVAL: Thos. S. Southworth. (Arch. of Ped., July 1921.) The author stated that the four hour nursing interval, advocated by Czerny, had been widely adopted in the expectation that it would clear away many of the difficulties of the nursery. Within limits, it had proved helpful, but like many other dicta it was too sweeping for universal application. In a former paper attention was drawn to the longer or shorter period of adaptation which a very considerable number of new born infants and their mothers had to go through before mutually satisfactory nursing, with an attendant gain in weight was established. The four hour interval appeared to be admirably adapted for the vigorous normal infant at full term, nursing a normal mother with an abundant supply of good breast milk. However, this group as a whole thrived in former days with regular three hour intervals or two hour intervals, or indeed, in unregulated cases, where the infant asserted its own times and requirements. There have been certain types of more exceptional cases in which the longer interval proved distinctly superior. One was where tenderness of the mother's nipples with risk of infection and mammary abscess not only made shorter intervals more hazardous but painful nursing prevented the full maternal cooperation so necessary to the normal adjustment between mother and infant. The second was that not uncommon type, the over-rich, high-fat breast milk. It seemed then that the longer interval was especially adaptable to cases that departed from the normal, to cases of maladaptation. However premature infants required more frequent feeding than those born at term. The author had seen dire results of applying this rule to them. Of full term infants there was the sluggish dormant infant whom it was difficult to stimulate to take a sufficient quantity of breast milk. There was the baby who was too weak or learned with difficulty to take the nipple especially from moderately malformed nipples and did not empty the breast; the nervous, inexperienced mother who did not know how to cooperate with the baby and defeated its efforts; there was finally the large and perhaps increasing number of mothers whose breast milk, while scanty and insufficient, was capable of being made sufficient enough to establish maternal nursing wholly or in part if stimulation was maintained with adequate frequency. Complemental feeds given at the conclusion of a nursing, to make up deficiency in breast milk, were always justifiable when the case was managed but the substitution ignorantly made of one or more bottle feedings to take the place of already too infrequent breast nursings was the most scientific way of drying up breast milk. The four hour interval was applicable to breast feeding but it did not necessarily follow that it was applicable to bottle feeding. In such cases the author recommended the shorter interval. The acceptance of a hard and fast rule was a retrograde step to our best tradition since the needs of the individual must be carefully weighed in reference to this factor of interval as well as to all other factors in infant feeding.

R. N. ANDREWS.

THE EFFECT OF COMPRESSED YEAST IN THE FOOD OF INFANTS: Maynard Ladd. (Arch. of Ped., July 1921.) The writer states that it might be accepted as a general statement that the food for an infant must have the three known vitamines, fat soluble A, water soluble B, and antiscorbutic C, vitamines and they must be present in sufficient amounts. It is no less important to have sufficient amounts of fats, carbohydrates and protein, mineral matter and water to meet the individual requirements. Intelligent feeding presupposes that the physician has clearly in mind all these requirements when he undertakes to prescribe a substitute for the infant. It is a rare exception when a normal baby cannot be successfully reared on cows' milk properly

adapted to its individual needs. It is his opinion that conclusions reached in the feeding of rats, guinea pigs, fowls, dogs and pigs might also be applied directly to infants. Milk was not a natural food for these experimental animals except for a very limited period. Osborne and Mendel have shown that their experimental animals, failed to show normal growth when milk was added to their diet, whereas with a small amount of yeast, normal growth followed. Other men had similar experiences.

The question the writer had in mind, was to determine whether the addition of yeast, which presumably was rich in water soluble B vitamines, would favorably influence the development of infants the first year. So much has been written concerning the value of yeast that the author thought that many practitioners would be directed away from the principles of sound and scientific feeding in the hopes that a few pellets of metagen or the daily ingestion of a yeast cake would solve the problem of a deficient feeding case.

The author says that he is not trying to undervalue the brilliant work done in the laboratory but he knew from personal contact with general practitioners that many physicians were likely to neglect the common sense of infant feeding in the faith that there was a "get-fat-quick" method embodied in the use of the so-called vitamines marketed under high sounding names. In his cases he tried to determine only whether the compressed yeast added to the food which had been prepared and adapted, had any special value as a weight producer. These babies were all cases of difficult feeders. The weight charts all gave evidence of satisfactory development, but careful analysis of the rate of weight development during the period with yeast and without yeast did not show in his opinion any benefit that could be attributed to the yeast itself. As to the value of yeast in cases of acne and furunculosis, the series of cases gave no definite evidence.

R. N. ANDREWS.

A young woman wants position as laboratory technician, preferably Minnesota, either with a group of physicians or in commercial laboratory. Experience: Basal Metabolism work, bacteriological and routine clinical laboratory work. Best of references. Address XYZ, c/o Minnesota Medicine.

BOOK REVIEWS

SUBMUCOUS RESECTION OF THE NASAL SEPTUM. By W. Meddaugh Dunning, M. D. Cloth. Pp. 97, with 25 illustrations. New York: Surgery Publishing Co., 1921.

This little volume deals with the subject of submucous resection of the nasal septum in a comprehensive and practical manner. A brief consideration is given to the anatomy and physiology of the nose, as well as to the etiology and role of septal deviations.

The surgical procedure as advocated by Dunning (which is in the main the purpose of the work) varies from that of many operators in that he employs a curette to penetrate and scoop out the septal cartilage. Yet there are features to commend it. The "L" shaped incision as proposed by him is ideal. The technic is conservative, advocating removal of only that portion of the septum which produces obstruction. The method presented by the author for the removal of spurs is a good one. The etiology and prevention of "saddle-back" nose is discussed, yet this must needs be rare as the result of operative technic. The results obtained by the author in operating "asthmatics" for septal deviations are interesting, though the contention of many rhinologists is that spure of pressure points bear no relation to asthma except when the sinuses are involved.

C. H. GORDON.

DETECTION OF POISONS. Antenreith & Warren —P. Blakiston's Son & Company. Price $3.50.

The fifth edition of this book is a most complete treatise of the subject of the detection of poisons. Various tests for various poisons are given in great detail and are accompanied by twenty-five illustrations and numerous graphic chemical reactions.

Because of its very technical nature, however, this book will be little used or appreciated by either the practising physician or routine laboratory worker, but will be most invaluable to the chemist or toxicologist.

MARGARET WARWICK.

Wanted—A-1 location for physician in town of 500, Northern Minnesota. Write for particulars. B-26, c/o Minnesota Medicine, Minneapolis, Minn.